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PHILADELPHIA COLLEGE OF PHARMACY.

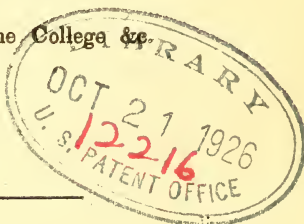### EDITED BY

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VOLUME VI.

R S,

CONTENTS.

No. I.

ORIGINAL COMMUNICATIONS.

SELECTED ARTICLES.

AA

iv Contents.

No. II.

ORIGINAL COMMUNICATIONS.

Apparatus for freezing water by the aid of sulphuric acid. By R.
    Hare, M. D., Professor of Chemistry in the University of Pa.   91
Minutes of an Analysis of Soup containing Arsenic. By Dr. James
    B. Rogers, Geo. W. Andrews and Wm. R. Fisher, Associate
    Members of the Philadelphia College of Pharmacy,   -   - 94
On Iodine and its combinations. By Augustin Duhamel, -   - 101
Medico-Botanical Notices, No. 3, -   -   -   - 118

SELECTED ARTICLES.

On Syrup of Asparagus &c. By A. Latour (de Trie) and Roziers, 122
On Viscine, a new vegetable principle. By M. Macaire,   -   - 125
On the action of cold concentrated Sulphuric Acid on Copper. By
    M. Barruel, Jr.   -   -   -   -   - 127
New Alcaloid substance discovered in Yellow Bark. By M. Henry
    and A. Delondre,   -   -   -   -   - 129
On Creosote and its preparations. By M. de Reichenbach,   - 131
On preparations of Aconite. By M. Soubeiran,   -   -   - 132
On Iodides of Lead. By M. Denot,   -   -   -   - 134
On Rhatany Root. By M. Soubeiran,   -   -   -   - 141
On the Manufacture of Sulphuric Acid, and on the white crystalline
    substance which is formed during that process. By S. L.
    Dana, M. D.   -   -   -   -   -   - 144
An account of some experiments made with Mr. Jos. Saxton's Elec-
    tro-Magnetic Machine. By Jacob Green, M. D., Professor of
    Chemistry in Jefferson Medical College,   -   - - 153
Carbonic Oxide Gas, obtained free of Carbonic Acid. By Thomas
    Mitchell, M. D., Professor of Chemistry and Pharmacy in the
    Medical College of Ohio,   -   -   -   - 157
Pharmaceutical Apparatus,   -   -   -   - 160
On Minium. By Richard Phillips, F. R. S.   -   -   - 162
Experiments on the action of Lime on certain solutions of Carbonate
    of Potash. By Henry Hough Watson,   -   -   - 166
Description of a new form of the Stomach Pump. By P. B. God-
    dard, M. D., of Philadelphia, -   -   -   - 169
    Miscellany,   -   -   -   -   -   - 171

Contents.

No. III.

ORIGINAL COMMUNICATIONS.

SELECTED ARTICLES.

No. IV.

ORIGINAL COMMUNICATIONS.

SELECTED ARTICLES.

Fig. 1

Drawn from Nature by W.P.C. Barton

Engraved by Kneass & Co. &c.

EUPATORIUM PERFOLIATUM.

Boneset, Thoroughwort &c.

Boneset.Thoroughwort.

Tab. 57

JOURNAL

𝔒riginal 𝔠ommunications.

ART. I.—ON EUPATORIUM PERFOLIATUM.
By R. Eglesfeld Griffith, M. D.

Nat. Ord. Compositæ. *Sub. Ord.* Eupatorinæ.
Sex. Syst. Syngenesia Æqualis.

Eupatorium. *Calyx* simple or imbricated, oblong. *Style* long and semi-bifid. *Receptacle* naked. *Pappus* pilose, or more commonly scabrous. *Seed* smooth and glandular, quinquestriate.—*Nuttall.*

E. perfoliatum. Stem villous. *Leaves* connate-perfoliate, oblong, becoming gradually narrower; serrate, rugose, tomentose beneath.—*Beck.*

Synon. *Eupatorium Virginianum, salviæ foliis.* Plukenet, Alm. 140.

> *E. foliis connatis tomentosis.* Cutler, 478.
>
> *E. connatum.* Michaux, Fl. Am. 2, 99.
>
> *E. perfoliatum.* Lin. Sp. Pl. 1174. Willdenow, Sp. Pl. 1761. Pursh. Fl. Am. Sep. 2. 516. Nuttall, Gen. Am. Pl. 2, 135. Barton, Comp. Fl. Phil. 2. 101. Beck, Bot. North. and Middle States, 198. &c. &c.

Icon. Pluk. Alm. t. 87, f. 6. Bigelow, Am. Med. Bot. t. ii. Barton, Veg. Mat. Med. U. S. t. 37.

Common Names. Bone set. Thorough wort. Indian Sage. Ague weed. Fever wort. Cross wort. Vegetable antimony &c. &c.

Pharm. Eupatorium perfoliatum. U. S.

Officinal. The whole plant.

Description.—Root horizontal, crooked, furnished with few fibres, perennial. Stem erect, round, hairy, simple at the base and trichotomously branched above; from two to four feet

A

high, generally of a grayish green colour. The leaves are opposite, decussating each other at regular distances, usually in pairs, but sometimes in threes, connate, perfoliate, broad at their base and gradually tapering to a sharp point. They are narrow, oblong, serrate, scabrous above and tomentose beneath, and like the stem, of a grayish-green colour. The upper leaves on the main stem, and most of those on the branches, are merely sessile, not being united at base. Flowers in a dense depressed corymb, formed of smaller ones; peduncles short and hairy. The calyx is imbricated and hirsute, the scales lanceolated and acute; each calyx includes from twelve to fifteen florets, which are tubulous, white and divided into five segments. The anthers are of a dark blue or black colour; filaments five, united in a tube. The seeds are black, prismatic, and acute at base, on a naked receptacle. Pappus furnished with scabrous hairs.

There are several varieties distinguished by the form of the leaves, the most striking of which is the **E.** *perfoliatum trifoliatum*, in which the leaves instead of being united in pairs are joined in threes; this variety is far from uncommon in the neighbourhood of Philadelphia, and in some localities is more plentiful than any other. The inflorescence of this variety is also in less dense corymbs.

Habitat.—The thorough wort is exclusively an inhabitant of North America, and is abundant in low grounds and on the margins of streams in every part of this extensive continent. It sometimes occurs in the greatest profusion, covering whole acres of ground. It flowers in the month of August, continuing in bloom until late in October.

Bot. Hist.—The genus Eupatorium derives its name from Mithridates Eupator, who is said to have successfully employed one of the species as an antidote against certain poisons. It is very extensive, containing nearly one hundred species, of which Pursh describes twenty-seven as natives of the United States, and although many of these are mere varieties, subsequent discoveries have shown that at least thirty species are indigenous; the remainder of the genus is pecu-

liar to other parts of the American continent, with the exception of a few species found in Europe and Asia.

Med. Hist.—The thorough wort appears to have been known to the aborigines, and to have been highly esteemed for its febrifuge properties; from them the early settlers in this country derived their knowledge of its virtues, and it became a favourite remedy in domestic practice, long before it attracted the attention of medical men. In consequence, however, of some experiments made with it in a variety of febrile affections, it gradually assumed the rank to which it was justly entitled and now recognised by all our Pharmacopœias and Dispensatories.

Med. properties and uses.—Every part of the E. *perfoliatum* is strongly though not disagreeably bitter. It has been employed to fulfil a variety of indications, as it is a tonic, a diaphoretic, or an emetic, according to the mode in which it is administered. Besides these properties, many others have been attributed to it by various writers, but apparently without foundation. In fact, if we were to credit one half that has been advanced respecting the curative powers of this vegetable, it would richly deserve the title of a universal panacea. Such, however, is not the case, and although it is indubitably a highly important article when properly administered, it is by no means deserving of the eulogies that have been so lavishly and injudiciously bestowed upon it.

As an emetic it is given in a warm decoction, and is considered by Dr. W. Ives as valuable in the early stage of autumnal fevers; it is, however, uncertain in its operation on the stomach, and perhaps scarcely is deserving of more attention in this respect than the decoction of chamomile, or other teas of a similar nature. In large doses it is also said to act on the bowels. Dr. Thacher states that it " has long been esteemed as an efficacious remedy in bilious colic accompanied by obstinate constipation," in the dose of a tea cupful every half hour, until it produce a cathartic effect. Here likewise we are somewhat sceptical, and feel inclined to believe that almost every mild decoction taken to this extent would be equally efficacious.

As a diaphoretic, however, we have ample testimony of its

powers, particularly in catarrhal affections. Dr. Anderson of New York, who made it the subject of his inaugural thesis, speaks of it in high terms in the various forms of intermittent fever. In his favourable opinion of the diaphoretic powers of the Eupatorium, Dr. Anderson is fully sustained by the testimony of numbers of distinguished practitioners. From an extensive use of it for many years, we have been led to conclude that although it is an exceedingly valuable auxiliary in the treatment of those complaints, it is not deserving of the high encomiums that have been bestowed upon it, and that it should not be relied upon to the exclusion of other and more effectual articles.

As a tonic, it is deserving of attention, and is well suited to those cases of dyspepsia and general debility which require the exhibition of the simple bitters. When administered with a view to its tonic powers, it should be given in powder or in cold infusion.

The thorough wort has also been highly praised in the treatment of certain cutaneous affections, but more evidence is wanting on this subject. Dr. William P. C. Barton, who gave it a trial in some cases of obstinate eruptions, found it wholly inefficacious. Dr. Zollickoffer, however, states that in Tinea capitis he has been eminently successful, by using it in conjunction with the *potass. sup. tart.*

Pharmaceutical preparations and mode of administration.— When administered with a view to its tonic effect, as has been already observed, it is to be given in substance in doses of from ten to twenty grains, or in cold infusion in doses of two or three ounces. The Pharmacopœia of the United States recognises but one officinal preparation, the infusion, which it directs to be made with an ounce of the herb to the pint of boiling water. According to Dr. Zollickoffer, when given in cases of Tinea capitis, the following formula is the best.

$$\text{R Pulv. fol. Eupat. perfol.} \quad \tilde{3}\text{ss.}$$
$$\text{Pulv. cremor tart.} \quad \tilde{3}\text{i.}$$

Mix and divide into eight powders, one of which may be taken in the morning, noon and at night, and continued until

the disease is removed. In cases of children, who are gene-
rally averse to taking the above preparation, he recommends
the following:—

R Fol. Eupat. perfol. ℥i.
Cremor tart. ℥i.
Aqua bulient ℥viii.

This preparation is to be permitted to cool, and a sufficient
quantity of loaf sugar added to bring it to the consistence of
a syrup, by boiling for ten minutes. The dose is two tea
spoonfuls, three or four times a day.

Analysis.—No analysis of this plant has been made since
the improvements in the processes for the examination of or-
ganic substances have taken place. Dr. Bigelow, however,
has detailed the results of an examination of it, which is
satisfactory as far as it goes. He says the flowers and
leaves abound in a bitter extractive matter, which appears to
constitute the remedial agent in the plant. This substance
is soluble in water and alcohol. It forms copious precipi-
tates with many of the metallic salts. Sulphuric and hydro-
chloric acids cause a slight precipitate from the aqueous de-
coction; chlorine, a more copious one; the nitric gives no
precipitate, but changes the colour to a red. Tannin exists
very sparingly. Sulphate of iron gave a dark green precipi-
tate, which subsided in a short time. On distillation, water
came over, very slightly affected with the sensible qualities
of the plant, and not alterable by sulphate of iron.

Some difference of opinion has existed among the advo-
cates of the Eupatorium, which portion of the plant was to
be used; Dr. Anderson concluding from his experiments, that
the active properties resided in the greatest quantity in the
leaves; in this opinion he is upheld by Dr. Chapman and
others, but more extended observations have shown that
every part of the plant may be advantageously employed.

All the species of Eupatorium appear to be endowed with
medicinal qualities in a greater or less degree, and some of
them have attained no little celebrity as antidotes against the
bite of venomous reptiles.

E. *cannabinum,* a native of Europe, was at one time in

high repute as a deobstruent; but the recent experiments of Deslongchamps and others show that its therapeutic powers have been much overrated.

E. *Aya pana*, a native of Brazil, was also considered entitled to a conspicuous rank as a universal panacea, and alexipharmic. A careful examination and trial of its reputed powers has, however, fully proved that, like many other equally vaunted articles, it was comparatively speaking, inert.

In the United States, also, there are several species which require notice, more especially the E. *teucrifolium*, or wild hoarhound. Dr. Jones of Georgia says that this plant "seems an excellent substitute for the Peruvian bark; indeed, among the planters on, or near the seaboard, it supersedes the use of the bark in the cure of fevers." He also remarks, "it is tonic, diaphoretic, diuretic, and mildly cathartic, and does not oppress the stomach as Peruvian bark is apt to do." The dose is one ounce of the leaves infused in a quart of water, which may be taken daily in doses of from two to four ounces every hour or two.

It is probable that most of our native species might be used as substitutes for the E. *perfoliatum*, more especially the E. *purpureum* and E. *maculatum*.

ART. II.—NOTE ON "PREPARED TUTTY."

By Wm. Hodgson, Jr.

As the impure oxide of zinc, long known under the name of *Lapis Tutia*, or tutty, still continues to be occasionally used, the following remarks on the article generally sold in this market under that name, may not be without value.

Having occasion to-day to purchase the article, I was struck with its appearance and its want of weight, and on looking at it closely I became convinced that it was not genuine tutty. On breaking the lumps, which were very light, soft and friable, I found that they were composed of small specks of a black and a white substance, interspersed in a light gray or lead coloured mass. There was, moreover, a very percep-

tible odour of lampblack about the broken pieces. I treated a portion of them with dilute sulphuric acid, which occasioned a copious effervescence, and would have dissolved the oxide of zinc, had any been present. The liquid was filtered; and in order to ascertain the presence of zinc, I tested separate portions of it with the following solutions:—

Ferrocyanate of potassa, added, produced a bluish milkiness. Hydriodate of potassa gave no precipitate, but the mixture became yellow. Pure potassa produced a very slight brownish white flocculence. Hydrosulphate of potassa, a white precipitate. Tincture of galls gave no change. I inferred from some of these results that the liquid contained no zinc; but to satisfy myself more completely, I evaporated a portion to crystallization and obtained only a very small quantity of fine silky and extremely minute crystals, which were easily recognized as sulphate of lime, and which were insoluble in cold water. It was therefore plain that the liquid contained no sulphate of zinc, and consequently that the substance under examination also contained none of the oxide of zinc.

On the admixture of the dilute sulphuric acid, the peculiar odour of lampblack had become much more apparent than before. I had now no doubt that the article was a mixture of lampblack and prepared chalk. Two drachms were treated with dilute muriatic acid, till effervescence ceased, and the solution was then filtered. What remained on the filter was chiefly and unquestionably lampblack, and weighed, when dry, six grains.

The filtered solution was treated with a solution of bicarbonate of potassa, which threw down most of the lime as a carbonate. This when dried weighed one drachm and a half, leaving the remainder dissolved in the water along with the carbonic acid, and muriate of potassa. By treating this with oxalic acid I obtained a further precipitate of twenty grains of oxalate of lime, equivalent to about fourteen of carbonate, making the loss on the operation ten grains; which may be accounted for by the substance being somewhat damp and the process conducted in haste.

I may here observe, that so far as I have been able to ascertain, this article is the only one to be found in our market under the name of prepared tutty. Its colour is entirely different from the article generally found in the British market, which is of a dull brown. Its weight also as above stated, is far inferior to that of the genuine tutty, which also, is in drops or irregular cones, but much more compact. The only authors whom I have found to describe it as of an ash gray and bluish colour, are Bussy and Boutron Charlard, in their treatise on the Falsification of Drugs. All the other books which I have consulted describe it as of a brown colour. I am told that the article now noticed is imported both from Germany and France; and it is possible that these authors have taken it for the real tutty.

Philadelphia, 1*st mo.* 27, 1834.

ART. IV.—ANALYSIS OF THE BARK OF THE PRUNUS VIRGINIANA.—By Stephen Proctor.

(Extract from Thesis.)

The bark of the wild cherry tree as found in the shops, is usually in pieces from two to six inches in length, of a cinnamon colour, more or less curved laterally, the pieces from the smaller roots being in some instances completely quilled, brittle, and of easy pulverisation, presenting a rough, splintery fracture, of a lighter colour than the external surface. The dry bark has but little smell, but when in the fresh state or in decoction it emits an odour like that of bitter almonds. It has a bitter, astringent, aromatic taste, and imparts its virtues to water, and to alcohol. The infusion, which is officinal in the United States Pharmacopœia, is made by macerating half an ounce of the bark in a pint of cold water for twelve hours. This is decidedly the best form for the administration of this remedy, as it possesses all the sensible properties of the bark in perfection, which is not the case with either the decoction, or the tincture. The decoction if the boiling is long continued, possesses none of the properties of the

bark, except its astringency; like the decoction of cinchona it becomes turbid on cooling, in consequence of the insolubility of the compound formed by the tannin and starch which it contains. The tincture is of a beautiful red colour, and has in a small degree the odour and taste of the bark; it is however never prescribed.

The importance of this article, as a medicine, as well as the length of time it has been in use, would induce the expectation of a more satisfactory chemical history than we find in medical or pharmaceutical records. Its peculiar action when taken into the system, has been attributed by most authors who have written on the subject, to the presence of hydrocyanic acid. The existence of this powerful agent in this remedy, was inferred from the close analogy which its sensible properties bear to those of the bitter almond, cherry, laurel, and other plants, which have long been known to contain it. This inference though plausible, has not, I believe, been demonstrated by experiment.

The following analysis was made with a view of ascertaining the actual constituents of this bark; in making it superior specimens of the dry bark were used, it being impossible to obtain it in the fresh state, at the late season at which the subject was taken up.

Experiment 1. The decoction decolourised by boiling with animal charcoal, strikes a deep blue colour with tincture of iodine, and is precipitated of a dirty white colour by sub-acetate of lead.

Experiment 2. Upon the addition of water to the tincture concentrated by evaporation, it threw down a curdy precipitate of a light brown colour, which upon examination proved to be resin.

Experiment 3. The infusion and decoction precipitate gelatine; they also cause a precipitate of a dark olive green colour in a solution of sulphate of iron.

Experiment 4. A saturated decoction of the bark was made, and digested with hydrate of alumina for twenty-four hours, afterwards filtered and concentrated by evaporation to one half; the concentrated solution was nearly colourless,

had a slightly sour and astringent taste, and turned the blue colour of litmus to a red; it also caused a dark green precipitate in a solution of sulphate of iron, and one of a brownish yellow in lime water, but did not precipitate gelatine.

Experiment 5. Digested 480 grains of the powdered bark in sulphuric ether for twenty four hours; the ether was then decanted and evaporated; there remained a white fatty matter which was insoluble in alcohol, and left a greasy stain upon paper.

Experiment 6. Distilled four ounces of the bark coarsely powdered with one quart of water, in a suitable retort, (heated by means of a sand bath,) till the water came over inodorous; the product of the distillation had a milky appearence, and the odour of bitter almonds; the exhausted residue was then removed from the retort, and replaced by four ounces more of the powdered bark, upon which the distilled liquor was returned and the distillation repeated; this process was continued until one pound of the bark had been consumed; during the latter stage of the process globules of oil were observed floating on the surface of the liquor in the receiver; they however, from their superior specific gravity soon fell to the bottom. After the distillation was completed the oil was separated and preserved in a vial.

Experiment 7. After the separation of the volatile oil, a few drops of a solution of sulphate of copper were added to a portion of the distilled liquor, and the peroxide of copper precipitated by caustic potassa; muriatic acid was then added which dissolved the peroxide of copper, leaving the solution of a milky appearance in consequence of the cyanuret of copper diffused through it.

Experiment 8. Repeated the preceding experiment substituting sulphate of iron, for the sulphate of copper, upon the addition of the muriatic acid, the colour of the solution changed to the characteristic deep blue, of the ferrocyanate of iron.

Experiment 9. The remainder of the liquor obtained by distillation, was saturated with peroxide of mercury, filtered and evaporated to dryness by the aid of a water bath; there

remained in the vessel a white mass crystallized in quadrangular prisms, the crystals were then reduced to powder, dried at the temperature of 212° Fahrenheit, and introduced into a dry glass tube bent rectangularly, and closed at one end; the open extremity was then heated in the flame of a blow-pipe and drawn out so as to form a capillary orifice, after which the matter contained in the closed end of the tube was decomposed by heat, and a colourless gas came over, which burnt with a beautiful purple flame characteristic of cyanogen; there remained in the tube metallic mercury and a small portion of carbonaceous matter.

Experiment 10. Submitted a portion of the crystalline matter obtained as in the last experiment, to the process laid down in the United States Pharmacopœia, for obtaining hydrocyanic acid; the product obtained had all the properties of a weak solution of that acid.

Experiment 11. Incinerated 1000 grains of the bark, and obtained a residue weighing thirty grains; this residue was submitted to the action of boiling water, which dissolved three grains. The solution after being concentrated by evaporation, had an alkaline taste, effervesced strongly with acids, and restored the blue colour to litmus, reddened by an acid: it was then neutralized with nitric acid, and upon evaporation yielded crystals of nitrate of potassa.

Experiment 12. The insoluble residue of the preceding experiment was dissolved by nitric acid, (with the exception of a minute portion of carbonaceous matter,) with violent effervescence; the colourless solution thus obtained threw down a white precipitate on the addition of oxalate of ammonia, and a deep blue one with ferrocyanate of potassa.

It may be inferred from the foregoing experiments, that the principal constituents of the bark of the Prunus *Virginiana*, are as follows, viz:—1. Starch. 2. Resin. 3. Tannin. 4. Gallic Acid. 5. Fatty Matter. 6. Lignin. 7. Red colouring matter. 8. Volatile Oil. 9. Hydrocyanic Acid. 10. Salts of lime and potassa. 11. Iron.

The red colouring matter is soluble in alcohol and in

water, but insoluble in ether; its colour is rendered much deeper by the addition of an alkali.

The volatile oil of the wild cherry bark is of a light straw colour, soluble in alcohol and in ether, and is extremely analogous in its properties to the essential oil of bitter almonds; it acts with equal energy on the animal economy, and might be used in medicine for the same purposes: in the dose of two drops it proved fatal to a full grown cat in less than five minutes.

Five hundred grains of the bark afforded two hundred and ten grains of watery extract, of a dark red colour, and of a sweetish bitter and extremely astringent taste. The same quantity of bark yielded one hundred and eighty grains of alcoholic extract, of a lighter colour, more bitter, but less astringent in its taste than the extract obtained by water.

The late Dr. Conwell, in his Dissertation on Vegetable Chemistry, mentions that he has obtained from the bark of the wild cherry tree an alkaline principle to which he has given the name of cerasia. To obtain it he evaporated a decoction of the bark, acidulated with sulphuric acid, until sufficiently concentrated, and then obtained the sulphate of the alkali in crystals by refrigeration. The salt thus obtained appears to be sulphate of lime; it is not decomposed at a red heat, and when in solution throws down dense white precipitates, with oxalate of ammonia and muriate of baryta.

ART IV.—NOTE ON THE MANUFACTURE OF ICHTHYOCOLLA IN THE UNITED STATES. By J. V. C. Smith, M. D.

(Extract from a letter to D. B. Smith.)

Dear Sir—Since writing you, several weeks ago, I have been procuring information upon the subject of isinglass, with reference to sending the results to Philadelphia.

During the Revolutionary war the industrious females of Gloucester, a small fishing town on the island of Martha's Vineyard, supplied large quantities of cloth, of various kinds,

of their own manufacture, for the families of the then less enterprising towns of Salem, Beverly, and the adjacent settlements. The sizing used in stiffening this cloth was particularly admired, being made by boiling the air-bladders of the *hake*, in fresh water.

As the business of fishing kept gradually increasing from that eventful period, and the town of Gloucester in time became distinguished in this way, it was an object to economize, and to save every part of the fish.

The manufacture of isinglass was thought of; but the quality of that made from the sounds of cod, haddock and the like, which were, till within a few years, considered the most common fish, was not satisfactory, and the manufacture, therefore, was nearly abandoned. About this time, some aged people recollected the *Sandy-bay sizing*, (a part of the town of Gloucester, where the cloth was made,) which was the most welcome intelligence to those who had abandoned their works. Upon a careful course of experiments, it was satisfactorily ascertained that the sounds of the *hake*, Gadus *merluccius*, yielded the very best and purest kind of isinglass; it is certainly equal to that made from the sturgeon.

The air-bladder of this fish is much larger than any of the gadus family, thicker, and more detached from the neighbouring organs. When the fish is opened, it is easily peeled out whole, which cannot be done in the cod; and being thrown into a tub, very little is to be done with it: perhaps to be washed in clean water is all that is necessary, and then dried in the sun on the riddles, or fish-flakes, made of small underbrush. When partially dry, each piece is pressed between wooden rollers, where it is spread into a broad, thin sheet.

The long strips of isinglass, rolled up like a ribbon, are the intestines of the cod-fish, Gadus *morrhua*.

I have the foregoing account from an aged gentleman, who has witnessed the processes which have been detailed. That a very good isinglass may be made from the stomach of this family of fishes, is very certain; and I am not sure that it might not be made a profitable employment, the article being called *fish glue*, to be used by cabinet makers, colourers &c.

Quarantine Ground, *Port of Boston*, *Sept.* 2, 1833.

ART. V.—ON CIMICIFUGA RACEMOSA. By John H. Tilghman.
(Extract from Thesis.)

The root, which is the officinal portion of the plant, consists of a short, knotty, dark brown or blackish caudex, very rough and jagged, which sends off numerous long, slender radicles, from the size of a needle to that of a crow quill, generally of a much darker hue than the caudex, wrinkled or shrunk on their exterior, and varying in length from two or three to as much as six or eight inches; when broken, they present a white, starchy interior, which in the dried root becomes somewhat ligneous; the fracture is short, and presents on the broken surface three distinct layers; the interior white, somewhat like pith, but which, when separated from the outer coating, is tough, flexible and composed of fibres running its whole length.   Between this and the epidermis is a greenish, spongy portion, which in the large roots constitutes two thirds of their bulk, and possesses, in common with other parts of the root, a peculiar earthy smell.

The taste of the fresh root is bitter, nauseous and astringent; that of the dried at first mucilaginous and earthy, and after being retained a few moments in the mouth, producing on the palate and throat a very bitter and disagreeable taste. Much, however, of the peculiar taste and smell of the root as found in the shops, may be said to depend on the mode and time of collecting, as well as the manner of drying and preserving it.   Several different samples of the root, which I had an opportunity of examining, possessed in very variable degrees, the peculiar flavour and taste which ought to belong to it when of good quality, arising, no doubt, from some one or perhaps all of the above mentioned causes.   The apothecary must therefore be unavoidably subjected to such inconveniences in many instances, unless he can devote a portion of his own time to the collection of the different indigenous medical productions.

The root, though very generally kept in the shops, cannot be said to rank among those indigenous remedies in common use

having passed gradually out of the hands of the physician into the list of domestic medicines or those of empirical use. Those authors who in writing of the medical properties of the Cimicifuga have drawn the line of distinction between it and the Actæa make no mention of the latter plant having gained the reputation of a remedial agent, from which the deduction may be drawn that all that has been said by writers who have not made the distinction respecting the medical uses of the actæa, may in common justice be referred to the cimicifuga. This, however, is not intended to be considered a positive assertion that the actæa does not possess medical properties, but is merely an inference drawn from the fact of the two medicines having been so often confounded, and from its being known that the cimicifuga does possess such properties.

We might suppose, though with what propriety I will not undertake to assert, that one of the evidences of its not having deservedly gained the reputation, formerly attached to it, is the fact of our having been permitted to remain till a very late period so much in the dark as to the nature and extent of its proximate constituents. So far as our knowledge extends, no analysis of its principles was made known to the world previous to that of Dr. Mears in 1827. There are individuals who assert their having obtained a crystalline matter from it, and who seem content with the mere fact of having isolated what they consider its active principle, without ever publishing for the benefit of the scientific community the process pursued by them for its extraction, much less an elaborate and satisfactory account of its chemical properties. Surely they can have a very limited desire for the progress of that branch of science with which their interests are so closely allied, who would for a moment withhold any information that would tend to cultivate a spirit of research among the pharmaceutical profession; however small the amount of information communicated might be, it would still constitute an accession to the general mass, and as such would not fail to produce its good effects. Such a desire has induced me to venture the result of a few experiments, made in a rough

way, and not with that strict regard to precision or accuracy
of manipulation that ought to be the aim of the student who
is not already initiated into the labyrinths of analytical re-
search ; and for the contracted nature and imperfections of
which I must beg to be considered as an apology, the very
late hour at which the subject was unavoidably taken up.

Before proceeding to the enumeration of them, it must here
be premised that the few that have been made have been
confined exclusively to the dried root, as it was altogether
impracticable, under existing circumstances, to obtain it in a
fresh state ; care, however, was taken in selecting roots that
had been well preserved, and collected during last autumn.

Two ounces of the powdered root were digested in f ℥iij.
of sulphuric ether several days, filtered and by evaporation
deposited on the side of the vessel a fatty matter, insoluble in
water, soluble in cold alcohol, and leaving a greasy stain upon
paper ; beside this a soft extract of a greenish colour was left,
possessing the bitterness of the plant, and a peculiar heavy,
somewhat narcotic odour ; this was treated with boiling al-
cohol and animal charcoal previously purified by muriatic
acid, filtered, and by evaporation deposited the fatty matter
and extract in very much the same form.   A strong decoc-
tion was made by boiling four ounces of the root in two pints
of water down to one ; this when filtered threw down a co-
pious precipitate on the addition of pure alcohol which was
gum ; liquor plumb. subacetat. also caused a precipitate con-
sisting of gum, colouring matter and other foreign substances.
Treated the root that had been used for making a tincture
with boiling water an hour, filtered and added tincture of
iodine, which caused an abundant precipitate of a deep blue
colour indicating the presence of starch.

A concentrated tincture of the root yielded by evaporation
a dark brown extract insoluble in water, but soluble in alco-
hol and ether, and possessing the properties of resin ; the
tincture was precipitated immediately and very abundantly
on the addition of water.

The decoction was precipitated by the carbonates of po-
tassa and ammonia, and by alumina ; also, by a solution of

gelatine yellowish and sulphate of iron black, from which the presence of tannin may be expected.

A strong tincture was precipitated by ammonia dark brown; this was collected and treated with alcohol and animal charcoal, filtered and evaporated, and deposited a crystalline matter of a warm, somewhat peppery bitter taste, and a dark brown transparent matter which remained fluid while hot, but on cooling solidified to the consistence of wax, which it resembled in all its properties.

Digested a portion of the decoction with hydrate of alumina for three days, filtered and evaporated to one half. The solution reddened litmus paper speedily; possessed a slightly bitter and very astringent taste, was precipitated by subacetate of lead white, and very abundantly; dark green approaching to black by sulphate of iron; also, by lime water and the carbonate of potassa and soda; but was not disturbed by a solution of gelatine, from which we may suspect the presence of gallic acid, as tannin would cause a precipitate with the latter reagent.

The solution containing the gallic acid yielded, by evaporation, an extract of the consistence of thick honey, which was insoluble in alcohol and ether, but readily soluble in cold water, and possessing a decidedly sweet taste; from which, and from the fact that all the decoctions when the least concentrated, had this sweetness, we may infer the presence of sugar in some way combined.

Submitted four ounces of the bruised root to the action of one quart of water for several days, after which chloride of sodium was added, and the whole submitted to distillation by means of a sand bath, as long as any fluid passed over; this was thrown back on a fresh portion of the root, and distilled as before. In this manner the cohobation was repeated several times; the water that passed over was rendered quite opaque, or milky; was impregnated with a peculiar heavy, narcotic, disagreeable odour, but possessing no sensible taste; after the liquid had remained at rest several days, numerous minute particles of a shining appearance were seen floating on the surface, supposed to be oil, but so very minute as to

prevent an examination of their properties being made. By
evaporating a tincture of the root to a certain point, distinct
globules of oil may be seen floating near the surface of the
liquid, of a brown colour, and having a bitter taste and
slight odour.

There are two distinct colouring principles in this root;
one very black, which is taken up very freely by water, more
so when slightly acidulated, but very sparingly soluble in
alcohol or ether; the other, insoluble in water, sparingly
in alcohol, but imparting a rich green colour to ether when
digested with it.

Boiled two pounds of bruised root in *cong.* 1ss.: water, acid-
ulated with ℥1ss. sulphuric acid, an hour; strained the decoc-
tion, and added lime to saturation, collected the precipitate and
submitted the residue to the action of boiling alcohol, which de-
posited, by evaporation, a green, somewhat resinous matter, of
a bitter, nauseous taste. The precipitate by lime was treated
by boiling water and filtered, and yielded, by evaporation,
crystals in very fine transparent needles, gritty under the
teeth, and having no perceptible taste; these were insoluble
in alcohol 40° Baumé, or ether; very slightly so, if at all,
in boiling alcohol, but very soluble in dilute acetic acid,
giving rise to a slight effervescence. These, which at one
time might have been classed along with cerasia, mahogonia
&c. as a vegetable alkali, proved by making an acid solution
of them, and adding oxalate of ammonia to the lime.

A saturated tincture which had digested during several
months, was placed in a retort, and by a water bath two-
thirds of the alcohol was distilled over, which retained the
peculiar odour of the plant, but was not bitter; yielded no
residue by evaporation, and was not precipitated by any
of the ordinary reagents; toward the close of the distillation
a few globules of a dark brown matter, were seen floating
near the surface of the liquid, which, from general appear-
ance, I took to be oil; but it was in too small a quantity to ad-
mit of an examination of its properties; a considerable propor-
tion of a shining extract, having a nauseous, disagreeable,
though not very bitter taste, remained in the retort, freely

soluble in alcohol, less so in ether, and became white and milky on the addition of water.

One thousand grains of the root yielded, by incineration, seventy-nine grains of ashes; by treating these with boiling water and filtering, a strong alkaline solution was obtained, which changed turmeric deep brown, and restored the colour of litmus previously reddened by an acid. Considerable effervescence took place on the addition of an acid; the solution formed crystals of bitartrate of potassa on adding tartaric acid in excess, and was precipitated by muriate of baryta.

Another portion of the ashes was treated with boiling dilute muriatic acid, filtered, and on adding oxalate of ammonia, a dense white cloud was produced, supposed to be lime.

Treated the ashes with concentrated sulphuric acid till effervescence ceased, and added water to dilute the solution. On adding a few drops of a solution of ferrocyanate of potassa, a deep blue precipitate was thrown down, as a ferrocyanate of iron. Neither infusion nor tincture of galls gave indication of the presence of iron in this solution, owing perhaps to its being in the state of peroxide, as Dr. Turner says the iron must be as protoxide, or what is better a mixture of protoxide and peroxide, to give indications of its presence with this test; the solution, however, threw down a blood red precipitate on adding sulphocyanate of potassa, thereby denoting to a certainty the presence of iron. By treating the ashes with boiling water acidulated with sulphuric acid, and filtering the solution, it deposites by slow evaporation a large quantity of transparent needle shaped crystals, possessing an intensely sharp acid taste, owing in some measure to an excess of acid, sparingly soluble in water, precipitated by the carbonated alkalies and oxalate of ammonia. The mother water being separated from these, precipitated by carbonate of soda, collected and dried, gave a white, soft powder, almost insoluble in water, but readily dissolved on adding an acid, and giving rise to effervescence; the aqueous solution possessed alkaline properties, changing turmeric to brown, was precipitated as a hydrate by caustic potassa and ammo-

nia and by carbonated alkalies. On adding phosphate of soda to the solution, no precipitate immediately falls; but on adding ammonia in small quantity a copious white precipitate is thrown down, which Professor Brande calls a triple ammonio-magnesian phosphate.

From the result of these few experiments we may venture the following enumeration of the constituents of cimicifuga :— 1st. Fatty matter. 2d. Gum. 3d. Starch. 4th. Resin. 5th. Tannin. 6th. Wax. 7th. Gallic acid. 8th. Sugar. 9th. An oil. 10th. Black colouring matter. 11th. A green colouring matter. 12th. Lignin, to which may be added salts of lime, iron, magnesia and potassa. These experiments have not led me to any decided conclusion as to the nature of the active principle of cimicifuga. The peculiar bitterness and nauseating properties of the plant seemed more fully developed in the ethereal extract than in any other form that came under my observation.

The root was treated by the process for obtaining sulphate of quinine, but with no satisfactory result; as also by several other processes, but which as they threw no light on the subject, are not considered worth mentioning in this place.

Having understood that a druggist in this city had obtained from the cimicifuga a crystalline matter which he considered to be its active principle, I felt some desire to be acquainted with its properties, and for that purpose a small quantity was procured, and submitted to what little examination my time would allow being made.

It was in a state of coarse granular, rather than crystalline powder, of a white colour, tasteless and inodorous, having rather a gritty feel under the teeth; insoluble, or to a very slight degree, in water, alcohol, or ether, soluble in dilute nitric and muriatic acids, from which it is precipitated by ammonia, very sparingly soluble in dilute sulphuric acid, and is thrown down immediately on adding a few drops of ammonia. The concentrated acids effected no change in its appearance; and when treated with boiling water and the solution filtered, an opake, whitish precipitate is formed on adding oxalate of ammonia in small quantity. From the re-

sult of the experiments above mentioned, we may conclude that a considerable per cent. of lime entered into its composition.

ART. VI.—MEDICO-BOTANICAL NOTICES. No. 2.

Spikenard.—It is evident, from the writings of Pliny and other ancient authors on natural history and materia medica, that the name of *Nardus* was indiscriminately applied to a variety of aromatic plants, and hence the utmost difficulty has attended all attempts to ascertain what vegetable furnished the true oil of spike. Sir William Jones published in the Asiatic researches an account of a plant called by the Hindoos, *Jatamansi*, which, from the description he received of it, he considered to be a species of *Valeriana*, and to afford the true spikenard of the ancients. His conjecture as to the genus to which it belonged, was confirmed by Roxburgh, who published a figure and description of it in the same work, and which, it should be noticed, agree very well with the representation by Garcias of this drug. This opinion has been adopted by most of the late writers on the materia medica without scruple. Ainslee, however, in common with several other eminent authorities, doubts the correctness of ascribing the Spikenard to the Valerian, and seems to think that it is derived from the Cyperus *stoloniferus*, Rottler, and Sir William Blane ascribes it to the Andropogon *parancuia*, the essential oil of which is much used in the east as a stimulant. Notwithstanding the arguments adduced by Sir William Jones, (Asiatic Researches, iv. 109,) this opinion, or at least that the Spikenard of the ancients was the product of a gramineous plant, appears to be sustained by the best proofs, as may be seen in the *Hierobotanicon* of Celsius.   G.

Nutmegs.—An importation of nutmegs has lately been made into Philadelphia, of a kind which are but rarely seen in our markets. They are still enclosed in their shell, which is oblong, about the size of a date, smooth, brown and shining;

on breaking this shell, the nutmeg is seen covered with a yellowish brown epidermis, somewhat resembling mace, but tasteless; the nut is much less marked with furrows than the true nutmeg, has less specific gravity, with fewer but darker coloured veins; it also appears to be inferior in strength to the true nutmeg, if fresh and of good quality, but is fully equal to those generally found in the market.

They were at first thought to be the product of the M. *tomentosa*, Willd., M. *Malabarica*, Lamark, *Nux macis mas*, Rumphius, v. ii. 24. t. 25, Celsius *Exot.* 14, which is a native of Banda, Amboyna &c., but it does not agree with the description given by authors of the fruit of this species in many particulars; this is described by Merat and De Lens, in their admirable dictionary, as follows: "Fruit larger than the true nutmeg, oblong, lighter, less aromatic, with red veins which are larger and concentric, not furrowed on their external surface, but smooth. The shell is very shining, brown, with more marked furrows, though fewer in number than in the true nutmeg." There is no doubt that the article in question is one of the species which have been confounded under the name of *male nutmegs*, and may be the fruit of the M. *Phillipensis* of Lamark, which bears an oblong nut, and is given by Sir James E. Smith as the same as the M. *tomentosa*, but we think erroneously.　　　　　　　　　　　　　G.

Maclura aurantiaca, Bow wood.—Dr. Torrey in his description of plants collected during a journey to the Rocky mountains, by D. E. James, has followed Kunth and Sprengel, in considering the Maclura as identical with the *Broussonetia tinctoria*, or Fustic of the West Indies. We have been led to doubt the suggestion of this able botanist on many accounts.

Dr. James describes the *Maclura* as follows, (Long's Exp. 11. p. 158,) "This tree rises to the height of twenty-five or thirty feet, dividing near the ground into a number of long, slender, and flexuous branches. The wood is of a yellowish colour, uncommonly fine and elastic, affording the material most used for bows by all the savages, from the Mississippi

to the Rocky mountains. The bark, fruit &c., when wounded, discharges a copious milky sap which soon dries in the air, and is afterwards insoluble in water, containing a large quantity of caoutchouc. The leaves are oval and entire, five or six inches long, and from two to three inches broad, smooth and shining on the upper surface. The fruit, in size and external appearance, resembles the largest oranges. It consists of radiating and woody fibres, terminating in a tuberculated and slightly papillose surface. In this fibrous mass, the seeds, which are nearly as large as those of a quince, are disseminated." Nuttall, in his *Genera N. A. Plants,* says that the pulp is nearly as succulent as that of an orange, sweetish and perhaps agreeable when fully ripe. Dr. James, however, thinks that the fruit never becomes pulpy and succulent. The opinion of the latter is probably correct, for those produced at the garden of the Messrs. Landreth, certainly are not edible.

The leaves are petiolated, oval, acuminated, very *entire,* apex mucronulate, upper surface smooth and shining, petiole and nerves, on the under side, somewhat hirsutely but minutely pubescent. *Nuttall.*

The *Broussonetia tinctoria,* according to the description of Sloane, is a tree of sixty feet high, with oblong, pointed, serrated, rough leaves, cordate at base. The fruit is about the size of a nutmeg, formed like other mulberries, of a greenish colour both within and without; when ripe it is pleasant to the taste, but lusciously sweet. No good figure has ever been given of this tree. From a comparison of specimens in the herbarium of the Academy of Natural Sciences, with those of Maclura, the correctness of Sloane's description of the foliage was verified; in fact the most cursory examination of specimens of these two plants would at once satisfy the most sceptical that they are very distinct.

The wood of the Maclura is not unlike that of Fustic, but is of a richer yellow, and has more specific gravity. The following experiments were made to ascertain its tinctorial properties in comparison with those of Fustic.

The wood when rasped was of a rich orange yellow, and

somewhat resembled in odour the common quercitron bark. Its decoction is of a light yellow, inclining to orange. Its alcoholic tincture was much darker, being of a yellowish brown. The taste of the decoction was very slightly bitter and astringent.

It colours cotton and wool of a light yellow, which however is not permanent. If alum be used as a mordant, the colour is brighter and more solid; never, however, equalling that produced by the Fustic.

With the preparations of iron it strikes a dark brown black. The alkalies render the colour of the decoction darker. Gelatine precipitates part of the colouring matter, leaving the decoction of a brighter tint.

On the whole, it is evident that the colouring properties of the *Maclura* are inferior to those of Fustic, but at the same time it deserves attention as a yellow dye, and might also be advantageously substituted for Fustic in the preparation of olive and brown colours.   G.

ART. VII.—ON BICYANURET OF MERCURY, &c, &c. By
WILLIAM ELLIS.
(Extract from Thesis.)

THE Bicyanuret, more commonly called the Cyanuret or Cyanide of Mercury, having been adopted by the United States and Dublin Pharmacopœias as an officinal salt for the formation of Hydrocyanic Acid; I was induced, from the importance of the latter as a therapeutic agent, and the disparity in the formulæ for obtaining the Cyanide, to make some experiments with a view of ascertaining the most eligible process.

The U. S. formula for obtaining the above salt is,

Red Oxide of Mercury ℥iij,
Ferrocyanate of Iron ℥vj,

to be well powdered and thoroughly mixed.

Distilled Water Oiij.

Boil in two pints of the water, constantly stirring till the

mixture becomes yellowish. After which filter through paper. Wash the residue in the remainder of the water and filter as before ; mix the solutions and evaporate till a pellicle appears, then set aside to crystallize.   To purify the crystals dissolve them in distilled water, filter and evaporate the solution and set it aside to crystallize.   Using half of the above quantities and proceeding according to the directions, I obtained ʒvi. of the salt, ʒiv. of it as the product of the first filtration and refrigeration perfectly pure—the rest obtained by careful evaporation was somewhat coloured.

The colour of the mixture after being boiled was of a greenish brown, very much the colour of tartrate of iron. Not of a yellowish colour which it is stated is produced.

The Dublin formula is

Red Oxide of Mercury	℥v,
Ferrocyanate of Iron	℥vi,
Distilled Water	℥xl.

Boil for half an hour constantly stirring. Wash the residue frequently in warm distilled water.   Filter the liquors and evaporate them until they furnish crystals by refrigeration. Using half the quantities of this formula, I obtained as the product 3xi of the bicyanuret in regular crystals, but little coloured.   The colour of the mixture was of a light brown —the change indicative of the complete decomposition of the ferrocyanate.   The Prussian blue of commerce is the kind intended to be used in both these processes.   The equivalent quantities for mutual reaction are 216 of red oxide of mercury, and 188 of pure Prussian blue.   The Dublin formula approaches these quantities much nearer than the U. States, but as the commercial article of Prussian blue is used, these proportions are not the proper ones for practice.

In the Edinburgh Journal of Science, the quantities given as being the best proportions, are eight parts of pure Prussian blue, finely powdered and well dried, to eleven parts of the red oxide of mercury.   But this proportion of the red oxide is unnecessarily large, as the pure Prussian blue is used with it.   When used pure an equal weight of the red oxide would

more than be sufficient for decomposition—but for convenience sake, might always be taken, as well as for any economical consideration—being a cheaper preparation than the Prussian blue.

The Dublin formula differs also from that of the United States, in ordering the residue after filtration to be frequently washed with warm distilled water; and this direction though indefinite, might be followed in the U. States process, with advantage. The Paris codex differs from both in this respect—directing the washing to be continued till the water comes off tasteless. As long as the water comes off with the disagreeable metallic taste, which the salt of mercury will give it, crystals may be obtained from it. In these processes the product, when coloured, is owing to the presence of iron; and to free it from this, Berzelius recommends to dissolve it in water, and digest with a small quantity of the red oxide of mercury, which precipitates the oxide of iron; filter the solution, and to saturate it completely, mix with it hydrocyanic acid. Any excess of acid is of course driven off in the evaporation, and the only objection to this is that it requires the previous formation of the acid.

The product of the U. States formula was greater in proportion to the oxide of mercury employed, than that of the Dublin; but an increased proportion of the red oxide in the U. States process would in all cases be found practically advantageous, the purest commercial Prussian blue being used.

According to Chevallier, the most economical method of obtaining the cyanuret of mercury, is by decomposing a persulphate of mercury by the ferrocyanate of potassa, filtering the solution whilst hot in order to separate the iron of the ferrocyanic acid, and crystallizing the cyanuret of mercury by refrigeration. From 100 parts of ferrocyanate of potassa, and 200 of dry persulphate of mercury he obtained 145 of the salt. The salt obtained by this process, is about the same in proportion to the quantities employed, as will hereafter be seen, was obtained by the U. States formula, with some modification of it.

Winkler prepares it by the following process. Mix 15 parts

of ferrocyanate of potassa, with 13 of concentrated sulphuric acid, and 100 parts of water. Distil the mixture to dryness into a receiver containing 30 parts of water. The ferrocyanate is decomposed. Hydrocyanic acid distils over, and sulphate of potassa is formed in the retort. Reserve a portion of the acid, and mix the rest with 16 parts of red oxide of mercury in fine powder. Decant the liquor, and add for the purpose of saturating it, the acid that had been reserved. This process gives 12 parts of the bicyanuret. The product cannot in this instance, be said to be coloured, from the presence of iron, but from the sulphuretted hydrogen formed during the process. If the liquor were not treated with free hydrocyanic acid, after having acted on the red oxide, it might probably contain some of this oxide in excess and when evaporated, would yield instead of the bicyanuret, a peculiar salt composed of this cyanuret and the red oxide which crystallizes in small acicular crystals. Berzelius recommends the above process; and states, that from treating the residue in the retort by water, 5 parts of pure Prussian blue may be obtained.

All the ferrocyanate of potassa, it would hence seem, is not decomposed. The iron of the decomposed portion may be supposed to be brought to the state of peroxide by the water, and the undecomposed ferrocyanic acid to unite with it— forming the ferrocyanate of the peroxide, or the pure Prussian blue.

Using the quantities of the U. States formula, as before stated; boiling the mixture in all the water for half an hour; filtering whilst hot, and washing the residue with distilled water, slightly warmed till it came off tasteless. The product by evaporation was ʒx, of the cyanuret in regular crystals. A quantity equal to rather more than one half that obtained by the directions of the formula.

The light brown colour the mixture assumes by boiling, will always be obtained in less than thirty minutes, if at all; but where the ferrocyanate is in excess, this change in its colour is not produced. The light brown colour of the mixture in the Dublin process, was formed in about half the time

ordered for boiling; consequently further heating the mixture is not proper, as it would tend only to decompose, and drive off partly the salt of mercury formed in solution. A better direction would be to continue the heat till the light brown colour appears, or for half an hour.

There are two new combinations of the hydrocyanic and ferrocyanic acids, one of which at least, may hereafter form an important addition to the materia medica ;—if the experiments which have been made with them in Europe should be confirmed by the faculty in this country. These are the hydrocyanate and ferrocyanate of quinia. The former is the result of a direct combination of hydrocyanic acid with quinia, and contains 24 grs. of quinia to the ounce of liquid ; the dose of which in intermittent fevers, is from ten to twelve drops. Owing however to its great liability to undergo a change ; the ferrocyanate has been proposed as a substitute, and it is this latter combination, the introduction of which in this country is entirely new; and which promises to be a valuable remedy in periodical fevers, that is entitled to most consideration.

This salt is prepared according to M. Bertozzi of Cremona, by double decomposition of sulphate of quinia and ferrocyanate of potassa.

The following formula is given by that chemist :

Ferrocyanate of potassa 1½ parts,
Sulphate of quinine   1   part.

Triturate together. Boil the mixture in 7 parts of water; separate by decantation a greenish yellow oleaginous substance; which is to be washed in distilled water, and then dissolved in hot alcohol, filtered and evaporated. The product is a greenish yellow salt—equal to three-fourths of the quinine employed—in confused needle-shaped crystals, of very bitter taste; soluble in cold but more so in boiling alcohol. It is nearly soluble in hot water, which decomposes it into two salts ; the one soluble, the other insoluble. Of the result of this decomposition of which no further notice is taken, my time would not permit any investigation. The salt which I obtained by the above process, corresponds with the des-

cription M. Bertozzi gives; but is more highly coloured than some in my possession, prepared by Mr. G. B. Browne, operative chemist of this city; whose opportunities in the laboratory of M. Robiquet of Paris, where they manufactured considerable quantities of it; were such, that he may probably have a superior process for its preparation.

As the rationale of the formation of the bicyanuret of mercury involves a knowledge of the composition of Prussian blue, it must be borne in mind, that this substance consists of two equivalents of hydrocyanic acid, one of cyanuret of iron, and two of peroxide of iron. The two equivalents of hydrocyanic acid, react upon one equivalent of peroxide of mercury, and by a double decomposition, give rise to two equivalents of water, and one equivalent of the bicyanuret; the latter of which remains in solution while the cyanuret and peroxide of iron of the Prussian blue, are left as an insoluble residue. This is the most simple and correct rationale, perhaps, that can be given.

The following is from the Edinburgh Journal of Science, vol. v. The oxygen of the oxide of mercury unites with the iron and hydrogen of the ferrocyanic acid, while the metallic mercury enters into combination with the cyanogen, and the peroxide of iron is left as the insoluble residue.

As the result of my experiments I give the following modified proportions of the U. States formula, as being the most productive of any that can be adopted.

$$\text{Red oxide of mercury } \zeta\text{iv,}$$
$$\text{Ferrocyanate of iron } \tilde{\zeta}\text{vj,}$$
$$\text{Distilled water } \quad \text{Oij.}$$

Put the oxide of mercury and the ferrocyanate of iron previously powdered and thoroughly mixed together, in a glass vessel and pour upon them the distilled water. Then boil the mixture, constantly stirring for twenty minutes, or till it becomes of a light brown colour—filter through paper —wash the residue with warm distilled water till it comes off tasteless. Filter the liquors, mix and evaporate them until they furnish crystals by refrigeration.

ART. VIII.—OBSERVATIONS ON ORGANIC CHEMISTRY, &c.

By J. F. W. Johnson, A. M. &c.

Extract.

[The following observations are extracted from the highly valuable and luminous report made to the British Association for the Improvement of Science, at their second meeting, by Mr. Johnson, from which we have also drawn largely for our miscellaneous department, and regret that our limits preclude the insertion of the whole report.]

Vegetable products. The attention of chemists, long withheld from the department of vegetable chemistry, by the obscurity and difficulty of the subject, has of late years been more earnestly directed to this interesting field. The analytical researches of Gay Lussac and Thenard threw the first distinct light on the nature of vegetable compounds, and gave rise to the first general deductions in regard to their composition. Those of Saussure and of other chemists, whom the apparently simple method of analysis employed by Gay Lussac induced to undertake similar investigations, speedily added to the number of ultimate analyses. But the dissimilar and often contradictory results obtained by different experimenters in analysing the same substance, showed that few of those yet made known could be regarded as any thing more than tolerable approximations. The determinations of Berzelius and Dr. Prout were among the earliest on which confidence could be placed, and have proved almost the only ones which later investigations have not corrected.

In different countries attempts have been made to improve the method of vegetable analyses so as to secure more constant and more exact results. In England, Dr. Prout's apparatus, though less simple than that employed by others, has

in his hands led to results of the greatest precision. In France, Dumas, Pelletier, Henry, Plisson, and others have paid much attention to this subject. In Germany we owe to Liebig and Wœhler many of the best and most important analyses hitherto published on vegetable chemistry.

Another description of labourers also has done much in this field. The remarkable discovery of Serturner, that the opium of commerce contains a vegetable alkali or salt basis, (morphia,) to which its soporific virtues are owing, led the way to a train of vegetable research, from which large accessions of knowledge have been obtained. Pelletier and Caventou had the merit of first following up the investigation, and of making us acquainted with several of the most important vegetable principles hitherto discovered. They have been followed by many others, and with such success that during the fifteen years that have elapsed since Serturner's discovery began to attract the attention of chemists, we have been made acquainted more or less fully with upwards of *thirty* acid, and nearly as many alkaline principles, either existing ready formed in the products of the vegetable kingdom, or produced during the process employed for extracting their active ingredients. Besides these, upwards of fifty other principles have been described, possessing the properties or virtues of the plants from which they are extracted, but exhibiting neither acid nor alkaline properties.

While our knowledge of ultimate principles and their atomic constitution has thus been extending, several interesting theoretical inquiries have been raised, chiefly in regard to the manner in which the elementary atoms of which they are composed may be supposed to be grouped together. To a few of these I shall here briefly advert, as they will enable the reader better than any thing else to form a proper estimate of the true state of our knowledge in this department of the science.

Are vegetable principles binary compounds?—1. It has long been the opinion of certain chemists, and has lately been ably maintained by Dumas, that vegetable or animal principles containing three or more elements, ought not to be regarded

as simple combinations into which the elements enter singly, or as combinations of the first order, but as made up of two binary compounds of the first order, which unite together in virtue of their opposite electrical states, as an acid and an alkali do.   Thus sugar may be considered as a compound of carbonic acid and carburetted hydrogen, and the ethers as composed of etherine, which gives the general character to all, and of water or an acid which imparts its peculiar properties to each.   This view of organic principles is very simple, and gives a very clear idea of the way in which the elementary atoms are grouped; but while we admit the probability of the hypothesis, so many facts militate against it, that it cannot be received as a law.   One of the strongest of these is, that we know only of one or two cases in which these compounds can be resolved into their supposed binary elements; and none in which they can be artificially produced by uniting them. The interesting observation of Brande, that in the galvanic circuit the vegetable alkalies are not decomposed, appears also to oppose the idea of their being binary compounds.   Many of the vegetable acids also appear so obviously to be oxides of a compound radical containing hydrogen and carbon, that we should be neglecting the most striking analogies were we to adopt the opinion of Dumas in regard to them ; while on the other hand, the discovery of benzule by Liebig and Wœhler puts beyond question the existence of compound radicals of several elements, in which no such binary grouping can be supposed to have place.

Dr. Prout's view.—2d. A view of a different kind has been advanced by Dr. Prout, in regard to the arrangement of the elements in a large class of vegetable compounds. In sugar, gum, and starch of different kinds, he has shown that the oxygen and hydrogen exist in the same proportion as in water, and therefore suggests that such substances may in reality be compounds of water and carbon.   Such views are valuable as well as interesting when they they are drawn as deductions from a large number of analytical results, as those of Dr. Prout's are, but they are on the other hand productive

of much mischief when they are adopted on theoretical grounds, and the experiments afterwards instituted to confirm them.

Are the vegetable acids, oxides of compound radicals ?—3. A third theoretical view, not destitute of probability, is that which represents the organic acids as oxides of a compound radical. Thus, if we put $2C + O = R$ a supposed radical, we have—

$$\dot{R} = \text{ Mellitic acid,} \qquad \ddot{R} = \text{ Oxalic acid,}$$
$$\dot{R} = \text{ Carbonic oxide,} \qquad \ddot{R} = \text{ Carbonic acid.}$$
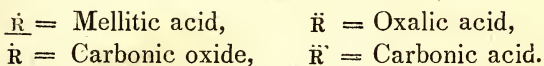
But there are difficulties attending this representation of the constitution of these compounds. Carbonic *oxide* contains more oxygen than mellitic *acid*, while oxalic, the stronger, contains less oxygen than carbonic, the weaker acid. It is not unlikely that future researches may supply us with a more satisfactory mode of obviating these difficulties, than we are yet acquainted with.

Again, if we take $C + \frac{1}{2}H = R$, we have the base of the following suite of acids :—

Citric acid $= \dot{R}.$ Tartaric acid $= 4. R. + 5. O.$
Formic acid $= \ddot{R}$ Pyrogallic acid $= 6 R + 3. O.$
Succinic acid $\overline{4.R} + 3. O.$ Tannin $= 6. R. + 4. O.$
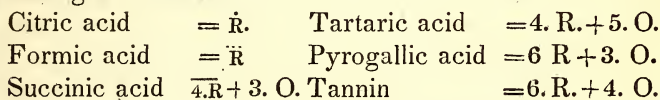
The crystalline compound discovered by Opperman as the base of artificial camphor $= 4C + 3H$. If we represent this by R we have,

$$\ddot{R} \qquad = \text{ Acetic acid,}$$
$$3R + O \qquad = \text{ Camphor,}$$
$$3R + (Cl + H) = \text{ Artificial camphor,}$$
$$\ddot{R} \qquad = \text{ Camphoric acid.}$$
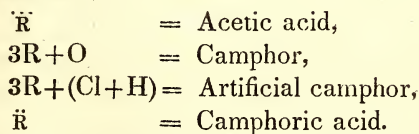
It is very interesting by means of such formulæ to compare the atomic composition of bodies possessing properties so different. That the acetic and camphoric acids are oxides of the same compound radical, does not appear probable, but the facts to be stated respecting benzule render it highly probable that the three compounds here classed along with it, have the same radical as the camphoric acid.

Does the azote in vegetable alkalies constitute ammonia ?—*4th.* It has been found that the vegetable alkalies, so far as they

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have been examined with care, contain as an essential constituent, a considerable quantity of nitrogen ; and the question early suggested itself—does the nitrogen in these salt bases exist in the form of ammonia ? If so, it would be easy to understand why they exhibit alkaline properties. The experiments of Pelletier and Dumas appeared to supply a negative answer to the question, as well as the later ones of Liebig, who found that though brucine and strychnine are completely decomposed by nitric acid, yet ammonia is not one of the products. But there are other circumstances which are considerably in favour of the opposite opinion. Thus, in the six vegetable alkalies, morphine, narcotine, strychnine, brucine, quinine, and cinchonine, Liebig found that each atom contained one atom of nitrogen, and that thus the saturating power of each was in proportion to the amount of that element which it contained. The sulphates he found also to contain two atoms of water,* corresponding exactly to the quantity of water found by Mitscherlich to exist in the crystallisable salts of ammonia with the oxacids. These coincidences are extremely curious, and though they prove nothing, yet they show that we are not yet in a state to answer the question, definitively, whether the vegetable alkalies do really contain ammonia or not.

Are vegetable principles educts or products.—5th. I shall only advert to one other point, on which considerable doubt will probably for a long time remain. I have already stated how numerous the proximate principles of the vegetable kingdom, acid, alkaline, and indifferent with which we are acquainted, have already become, and the rapidity with which their number is increasing. In regard to them also, an interesting question arises. Do they all exist ready formed in the vegetables from which they are extracted, or are they not often the *product* of the lengthened processes by which they are obtained? There is one test by which we can scarcely be deceived in determining this point. When the principle extracted possesses the virtues of the plant from which it is

* The sulphate of strychnine he has since found may be obtained in an anhydrous state.

prepared, the probability is very great that it exists ready elaborated in the natural state of vegetable. When it possesses no such properties, we can have no evidence, but the simplicity of the process by which it is prepared, that it is not the result of the treatment to which the vegetable has been subjected. And even this is not conclusive evidence; for though the process for extracting oils, by distilling the parts of plants with water is very simple, it has been shown that these oils do not always exist ready formed in the substance of the vegetable. Thus, from bitter almonds, alcohol or ether extract no oil, nor is any formed in them by the aid of heat, until water is added. The same is the case with the volatile oil of mustard seed. Now what happens in these cases is likely to take place in many others, so that it will probably be long before we are able to determine in all cases what are, and what are not real proximate principles. It will be still longer before we are able to refer each of them to its true place in a purely chemical arrangement, and to make them out to be so many determinate compounds of a series of organic radicals. The first step towards such an arrangement has been made by the discovery of the relation between benzoic acid and oil of bitter almonds; and we may hope that similar discoveries will gradually diminish the confusion and obscurity which at present prevail in animal as well as in vegetable chemistry.

Sulphur Salts. The most important modification which the received views in regard to the nature of saline combinations and the mode of naming them has of late years undergone, has been brought about by the elaborate researches of Berzelius into the constitution of the sulphur salts. The results of these researches were first published in six memoirs in the Swedish Transactions for 1825 and 1826, and afterwards in Poggendorf's *Annals* for the latter year. In the outset of his first memoir, he divides all electro-negative bodies into three classes.

1st. Such as combine directly with and neutralize the electro-positive metals, forming salts. These are chlorine, iodine, bromine and fluorine, and are named *salt-formers.*

2*d.* Such as do not neutralize, but form acids or bases when they combine with other bodies. These are oxygen, sulphur, selenium and tellurium, and are called, *acid-and-base formers.*

3*d.* Such as possess neither of these properties, but which with bodies of the second class form acids. These are azote, hydrogen, phosphorus, boron, carbon, silicon, arsenic and the electro-negative metals.

He then proceeds to describe the preparation and properties of a vast number of compounds of sulphur with the simple bodies, in which he demonstrates the striking analogy between that substance and oxygen; and shows—

1. That sulphur gives a numerous and interesting class of salts in which the oxygen in the oxygen salts is replaced by an equal number of atoms of sulphur, and that this exchange in many oxygen salts may be effected by a current of sulphuretted hydrogen, the hydrogen of which combines with the oxygen both of the acid and the base, and the sulphur takes its place.

2. That many of these salts, and generally all those of the metals which form with oxygen, alkalies, or alkaline earths, dissolve in water, crystallise, combine with water of crystallisation, unite with one another and with oxygen salts to form a double salts, exhibit different degrees of saturation, and in these follow the same multiples as the oxygen salts.

3. That the sulphur salts are formed in such proportions as generally to have corresponding oxygen salts, but that several classes of sulphur salts have been obtained, the oxygen salts corresponding to which are as yet unknown. Thus, for example, he formed three sulphur salts of arsenic, two of molybdenum, three of antimony, and one of tin, while of arsenic we know only two oxygen acids, and of molybdenum, one. Considerable obscurity still attaches to the compounds of oxygen and tin.

4. That the radicals of all the oxygen acids do not give sulphur acids, or at least that they have not yet been formed. Thus with chlorine, iodine, bromine, fluorine, azote, boron, silicon, titanium and selenium, he could form no sulphur acids or salts: the compound radicals of the organic acids

are in the same condition, though a mode of replacing their oxygen by sulphur may yet be discovered.

5. Negative or acid combinations of sulphur, (and consequent classes of sulphur salts) were formed with hydrogen, carbon, phosphorus, arsenic, molybdenum, tungsten, tellurium, antimony, tin, and less distinct ones with chromium, tantalum, gold, platinum, rhodium, and probably some other metals.

Chlorine Salts.—While Berzelius was pursuing his investigations into the nature of the sulphur salts, Bonsdorf, according to his first paper on the subject in the *Annales de Chimie,* had been led into similar views in regard to the chlorides and iodides. Led by the analogy which exists between oxygen, chlorine and iodine, in producing combustion when uniting with simple substances, and in forming soluble compounds with many fixed bodies, he adopted the opinion that chlorine, iodine, bromine and fluorine, like oxygen, were *acid-and-base formers,* producing by their union with the metals and other simple bodies, compounds which possess the properties of acids or bases. In support of this view, he showed that many simple chlorides and iodides might be made to combine into what were formerly called double chlorides, in which he supposed the one chloride to act the part of an acid, the other the part of a base, and he invented a nomenclature in accordance with his peculiar opinions. If the views of Bonsdorf are correct, the distinction which Berzelius makes between his *salt formers* and his *acid-and-base formers* is not founded in nature. Dr. Thomson has adopted these views and incorporated them in his system of *Inorganic Chemistry,* and Professor Daniell assumes that we cannot adopt the views of Berzelius in regard to sulphur salts, without making those of Bonsdorf our own also; but it appears to me that the two opinions stand upon very different grounds, and that however simple the views of Bonsdorf may render the consideration of the chlorine &c. salts, they can never be ranked in the same family with those of oxygen and sulphur.

The main chemical distinction between oxygen and chlorine is this—that while chlorine neutralises an electro-positive

metal and forms a salt with it, oxygen never neutralises the metals, but forms with them compounds possessing either acid or alkaline properties. The opinion of Bonsdorf is, that the chlorides are not neutral compounds, but that, like the compounds of oxygen with electro-positive elements, they are all either acids or alkalies, and that when they unite they do so precisely as an oxygen acid and an oxide do, forming a simple chlorine salt, in which the chlorine acts the part of the oxygen, as the sulphur does in the sulphur salts.

The evidence brought forward by Bonsdorf in support of this opinion, is as follows :—

1. The bichloride of mercury and other electro-negative metallic chlorides redden litmus, and they lose this property when they unite with a certain quantity of a more electro-positive chloride to form a double salt. Such chlorides &c. must therefore be held to possess acid properties.

2. Sugar has a strong affinity for bases; it forms also a crystalline compound with common salt, and therefore it is probable that the chloride of sodium is a base. He has endeavoured to confirm this conclusion by showing that though the chlorides of lime, sodium &c. exhibit no immediate action on reddened litmus or cudbear paper, yet that a slight change of colour may be observed in the course of half a day or a day upon cudbear paper that has been dipped into solutions of the chlorides of calcium, magnesium, manganese and zinc. That the slowness of this action is no proof of the absence of alkalinity, he endeavours to support by the example of the caustic alkalies, which do not act upon reddened litmus paper until they are moistened. It is not the alkali alone then, he infers, which alters the colour of the paper, but the alkali and water together.

These views are neutralised by the two facts advanced by Berzelius :—1st. That the protochlorides of the older metals, including iron and manganese, give in solution a red colour to litmus paper, and therefore should, on Bonsdorf's views, be called acids. 2d. That the protosulphate of iron also reddens litmus, and forms with sulphate of potash a crystallisable double salt which is perfectly neutral. The first of these sulphates

therefore should be an acid, and the second a base, and the compound a simple salt, were we to proceed upon such evidence as has been brought forward by Bonsdorf, in favour of his chlorine salts.

The object of Bonsdorf's papers is not merely to afford a simple theoretical explanation of the composition of the salts of chlorine, iodine &c. but to destroy the distinction hitherto made between this class of simple substances and that which comprehends oxygen, sulphur, selenium and tellurium; to place, in short, the chlorides, iodides &c. on the same footing with oxides and acids. To establish the complete analogy between the sulphur and oxygen salts, we have seen that Berzelius showed the existence of sulphur acids, agreeing precisely in composition with the oxygen acids, the latter elements being merely replaced by the former; that suites of acids were formed by sulphur with the same metal, as is the case with oxygen, and that in some cases the analogy was so close that metals which like tellurium form weak acids with oxygen, gave corresponding weak acids with sulphur. But in the chlorides we have no such analogies. There are no acid chlorides corresponding to the oxygen acids, no suites of acids with the same base corresponding for instance with the oxygen acids of arsenic or antimony. The chlorides which Bonsdorf calls acids have mercury, gold, platinum and palladium for their bases, with none of which does oxygen form an acid.

Bonsdorf is not unsupported in his views by the opinions of other chemists. In the same volume of the *Annales de Chimie* in which appeared his first paper on the double chlorides, is contained a valuable memoir by Boullay on the double iodides, and on some compounds of the iodides with the chlorides. These compounds he represented as simple salts, in which the one iodide acted as an acid, the other as a base, agreeably to the views of Bonsdorf in regard to the chlorides. Dr. Thomson has also adopted the nomenclature of Bonsdorf.

On the other hand his views are opposed by Berzelius and most of the German chemists. Leibig also, who about the same time with Boullay investigated many of these double

salts, and among others those which the cyanide of potassium forms with the chloride and the iodide of silver, the iodide of potassium with the cyanide of mercury, and the nitrate with the iodide of the same metal, met with difficulties which induced him to reject it. The objections that have been advanced against his theory, Bonsdorf has endeavoured to remove in a valuable paper on some new double bromides, published in the *Stockholm Transactions* for 1830.

Chemical Notation.—Some discussion has latterly taken place in the English journals on the subject of chemical and mineralogical notation. Berzelius, and after him the German chemists, have long been in the habit of using symbols to denote chemical substances and their compounds. In contriving these symbols, the initial letter of the Latin name of each substance was selected as the sign of that substance. Thus, Fe, *ferrum*, denotes iron; Sn, *stannum*, tin; Tu, *tungsten*; O, *oxygen*; S, *sulphur* &c. Adding these Fe+O, or $\dot{\text{F}}$, is protoxide of iron; S+3 O, or $\overset{..}{\text{S}}$, sulphuric acid; Fe+2 S, or $\overset{..}{\text{F}}$, bisulphuret of iron. When two or more binary compounds are united, as $\overset{..}{\text{S}}$ +$\dot{\text{F}}$e, forming sulphate of protoxide of iron, for the sake of shortness $\overset{..}{\text{S}}$Fe are placed together, without any sign between them; and in organic compounds, where three or more elements are present, as in cyanic acid, instead of placing the elements N+2C+O, they have been grouped thus, NC^2O, where the number of atoms of carbon is denoted by the index placed over its symbol.

This notation possesses the two great requisites *clearness* and *brevity*, and it would be very difficult to devise any other system which should possess them in an equal degree. It has been objected, however, that it has appropriated a mode of notation already employed in algebra with a very different signification, and it would certainly have been desirable if such an appropriation could have been avoided.

In the simple cases given above as illustrations, it is not very much longer to write N+2C.+O for cyanic acid, which is algebraically correct, than to express it by NC^2O; but if we go to more complex cases, we shall find pure algebraic notation become so cumbersome as to impair very mate-

rially both the requisites of a chemical notation; thus cyanate of ammonia, $NC^2O + NH^3 + \dot{H}$, represented algebraically is $(N+2C+O)+(N+3H)+(O+H)$, a form of notation which is much longer, but if we take an extreme case, like the double ferrocyanides formed by Mosander, we shall see how the clearness as well as the brevity of the notation will be impaired. One of these salts is composed of an atom of ferrocyanide of potassium united to an atom of ferrocyanide of magnesium, thus expressed, $(FeNC^2 + 2KNC^2) + (FeNC^2 + 2MgNC^2)$, which with all the algebraic signs interposed becomes, $((Fe + \overline{N+2C}) + (K + \overline{N+2C})) + ((Fe + \overline{N+2C}) + 2(Mg + \overline{N+2C}))$, while it is very desirable therefore to express the composition of chemical compounds by a notation as nearly algebraical as possible, it would obviously be a sacrifice to sacrifice both brevity and clearness to insert all the algebraical signs in *all* chemical formulæ.

Arbitrary Symbols.—For the purpose of simplifying notation, several arbitrary signs have been introduced by Berzelius. Thus the dot (.) over a letter denotes an atom of oxygen; the comma (,) an atom of sulphur; a horizontal line, (-) selenium; a cross, (+) tellurium. A long line (—) over a letter, denotes that it is an organic acid.

Oxymolybdate of potash	=	$\dot{K}\,\ddot{M}o$ or $\dot{K} + \ddot{M}o$
Sulphomolybdate of potash	=	$\check{K}\,\text{'''}{M}o$ or $\check{K} + \text{'''}{M}o$
Selenomolybdate of potash	=	$\overline{K}\,\overline{M}o$ or $\overline{K} + \overline{M}o$
Telluromolybdate of potash	=	$\overset{+}{K}\,\overset{++}{M}o$ or $\overset{+}{K} + \overset{++}{M}o$

$\overline{T}$, tartaric acid, $\overline{A}$, acetic acid &c.

Abbreviations also are employed; thus Cy is cyanogen$=N+2C$; Bz is benzule$=(14C+10H+20)$.—*British Association for promotion of Science*, second meeting.

ART. IX.—ON DIFFERENT KINDS OF GUMS.
By M. Guibourt.

Pseudo gum tragacanth, or gum sassa.—About a year since I for the first time met with, at a merchant's, a very peculiar gum, in mammillary masses of a tolerably large size, or in convoluted pieces resembling an ammonite; there were also some parcels that looked like large snails deprived of their shells. This gum is of a reddish colour, its surface is somewhat shining, and it is more transparent than gum tragacanth; it possesses the taste of this latter, with however a little acridity; when placed in water it becomes quite white, swells to four or five times its original size, but does not fall into flocculæ like gum Bassora, nor form a mucilage like gum tragacanth; it nearly preserves its form, and is very little soluble. A solution of hydriodate of iodide of potassium imparts a very intense blue colour to it.

Bruce, in his travels in Abyssinia, has described a tree named *sassa*, (Inga *sassa*, Willd.) which he says he has seen loaded with so great a quantity of lumps of gum, as to appear deformed. This gum is reddish, of a smooth and fine grain; it swells in water and becomes white, but preserves its form, thus differing from gum tragacanth, which it otherwise closely resembles. The inhabitants use it to stiffen cotton and other goods.

This description applies so exactly to the gum under consideration, that we cannot avoid supposing it to be the gum sassa of Bruce. From what was told me, it appears that it was bought in London about twelve years since, at the East India Company's warehouse. The barrel which I saw, the remains of a much larger quantity, weighed about 250 pounds.

In since searching for this gum, I found a whole case labelled *gum tragacanth*, and sold as such, which attracted my attention from the cornu ammonis-like form of several of the pieces. This gum, when culled, appeared to be composed of two different substances, one formed of the largest fragments and comprising all the convoluted pieces, was the most red,

scarcely dissolved in water, and struck almost as deep a blue with iodine as starch; this was evidently gum sassa. The other portion, composed of the smaller fragments, was whiter, and was perfectly analogous to gum tragacanth in its form and taste. Nevertheless, it was not in as small pieces as the true gum tragacanth; from this and from other characters, I have denominated it *pseudo gum tragacanth.*

If twelve grains of the pseudo and true gum tragacanth be steeped in water, both swell and form a mucilage, the latter, however, more readily than the former; so far, these two gums appear to differ but little, and can scarcely be separated. But if, when they are thus dissolved, two ounces of water and a certain quantity of ioduretted hydriodate of potassa be added, the gum tragacanth continues to form a thick and tenacious mucilage, of an uniform pale blue colour, which does separate by standing; whilst the other gum precipitates and forms a dark blue deposit, leaving the fluid colourless. But, as this result was obtained from the finest pieces, and those which most closely resembled gum tragacanth, and as the larger and darker fragments possessed the insolubility of the gum sassa to a greater degree, it appeared reasonable to conclude, that the pseudo gum tragacanth and that of sassa originally constituted but one species, which had been culled to obtain a better sale for that portion of it which most closely resembled gum tragacanth, but which may always be distinguished by a greater insolubility in water, and by the deeper colour it assumes on the addition of iodine.

I sought for other differential characters by means of the microscope, with the following results:—

Gum tragacanth.—Fine gum tragacanth dissolved in water, with the addition of a little ioduretted hydriodate of potassa appeared to be formed of the following parts:—

1. A gelatinous mucilage, not coloured by iodine, without defined edges, irregularly studded with spherical granules, generally very small, but sometimes of a larger size; these granules are a kind of starch. This gelatinous mucilage is only visible when the field of the microscope is illuminated by the direct rays of the sun; in other lights, it is only

manifested by vibrations communicated to it. In such case, all the granules experience a similar oscillating motion, maintaining at the same time their respective positions, thus furnishing an indication of the invisible bond that unites them.

2. A great number of granules of starch in the middle of the liquid, arising from the complete division of the gelatinous matter.

3. Of a number of transparent gelatinous membranes, tinged of a light yellow colour by the iodine, having a defined edge of an irregular ovoid form, unguiculate on one side, closely resembling a petal of a flower. These membranes which perhaps are hollow, are studded with granules of starch, in irregular groups. These membranes and their groups of granules, are without doubt the advanced stage of an organization, analogous to that of the *Bichatia vesiculosa,* (Turpin,) and which had reached its maturity and been destroyed in the two preceding forms.

4. Portions of compact, thick membranes, coloured yellow by the iodine, in distinct groups mixed with granules of starch collected in compact masses, like bunches of grapes.

5. Woody fibres.

The woody fibres and the compact membranes appeared to be adventitious. The starch, which constitutes an essential part, ought to be separated from gum, strictly speaking, if the latter be considered in a chemical point of view ; for it is evident, that the starch is acted on by the water, and hence the peculiar characters of the gum are not owing to it. The truly essential part of the gum tragacanth, and which alone merits the name of *Tragacanthine,* is the gelatinous portion of No. 1; and that of No. 2, which being in a more divided state, is capable of passing through a filter, and gives to the filtered solution, the properties I have ascribed to it in *L'Histoire des Drogues, tom.* 2, p. 268.

The starch of gum tragacanth differs from that of the cerealia and of farinaceous roots ; for in the latter it is composed of an insoluble integument and an internal soluble substance, both capable of being coloured by iodine, and only differing in the state of organization and cohesion of the in-

tegument, whilst the starch of gum appears to be entirely formed of a dense organised matter, affording but little soluble matter to boiling water; hence the residue of a treatment of gum tragacanth by boiling water, is formed of a large quantity of insoluble starch and ligneous fibres.

For some years past, there has been in commerce, a kind of gum tragacanth in large white plates, which differs from the true gum by containing a large proportion of soluble tragacanthine; hence its mucilage possesses an almost complete transparency, and is consistent and gelatinous; it may also be remarked that it is scarcely coloured by iodine. I am ignorant whether this gum is a natural product, or the result of a purification of gum tragacanth. Let this be as it may, this gum examined with the microscope, when suspended in water and coloured with iodine, presents only a few isolated grains of starch, No. 1, and some gelatinous mucilage, No. 1. The greater part of it was composed of the membranes, No. 3, but very thin and scarcely visible. This gum appears to be preferred in sizing calicoes &c., but it furnishes a less tenacious and a thinner mucilage than the contorted kind, and is not so good for the preparation of loochs and pastilles.

Pseudo gum tragacanth. The pseudo gum tragacanth, or small gum sassa, when steeped in water, swells and agglomerates like gum tragacanth, but if more water be added, the parts disunite and fall in flakes to the bottom of the vessel.

This gum coloured with iodine presented the following appearances under the microscope.

1. The same gelatinous mucilage No. 1, mingled with grains of starch, which formed the larger portion of the true gum tragacanth : except, that in the present instance, it is denser, and hence less soluble in water; the grains of starch are also more numerous.

2. Other gelatinous products, which not being transparent, are very visible, having sometimes the density of a membrane and in that case coloured yellow by the iodine.

3. Some yellow membranes like those of gum tragacanth, others larger and more diaphanous, as if about to disappear.

4. Masses of fecula, and granules isolated in the liquid.

5. Bundles of torn transparent tissue; woody fibres and a transparent yellow disk, traversed by parallel lines of spiral tubes.

Gum sassa. This gum under the miscroscope presents the following appearances.

1. Very visible gelatinous masses, not transparent; and studded with innumerable granules of fecula; the thickest portions appeared of a yellow colour.

2. A great number of fragments of compact, transparent membranes, coloured of a deep yellow by the iodine.·

3. Yellow membranes destitute of granules of fecula, and others in folds which contained masses of fecula coloured blue.

4. Isolated blue grains, some of them large, resembling those of gum Bassora.

If, as has been seen, a microscopic examination furnishes some characters to distinguish gum sassa from gum traga·canth, it also shows us, that these two gums result from a similar order of organization, which I believe to consist in a membranous sac containing the gelatiniform matter and separate groups of grains of fecula; so that on the rupture of the sac, the gelatinous matter becomes susceptible of division and of partly dissolving in the water, so that the fecula becomes disseminated. Moreover, gum sassa differs from gum tragacanth, exactly as the starch and different parts of barley, differ from the corresponding parts of wheat; by a firmer and more compact organization, which renders it less soluble in water. Like these feculæ also, gum sassa and gum tragacanth are produced by plants belonging to two different genera of the same family. The first is furnished by the *Acacia sassa*, Bruce, (*Inga sasa*, Willdenow,) the latter by different species of Astragalus.

This conclusion leads me back to Bruce and his description. I am of opinion that this celebrated traveller is mistaken, when he states that gum sassa was the *opocalpasum* of the ancients, merely because gum sassa comes from the same country as myrrh, and that the opocalpasum was formerly

used to falsify myrrh ; but independently of gum sassa having no resemblance in form or smell to myrrh, Dioscorides and Galen speak of the opocalsamum as the juice of a narcotic and poisonous plant. Valmont de Bomarre was therefore right in concluding that the opocalsamum was not gum sassa.

Valmont de Bomarre, on the other hand, was not aware that a gum of which he was the first to speak under the name of gum bassora, was the same as gum sassa, for the use which he indicates for gum bassora, as serving to stiffen cotton goods &c. is only applicable to gum sassa, and not to the substance which now bears the name of gum bassora, whose complete insolubility and want of cohesion render it wholly improper for this purpose. If it be considered that the gum bassora of Valmont de Bomarre appears to be the first that bore this name, we might be tempted to restore this application to it; but as the other gum, is the only one containing *bassorine*, a principle, whose name is universally adopted in chemistry, it appears to me that we must give the old name of gum sassa to that described by Valmont de Bomarre, and retain the appellation of gum Bassora, for that which contains bassorine.

Gum Bassora.—I give this name to the gum which was examined under the same name by M. Vauquelin, and which I described in *L'histoire des drogues simples, No.* 788, and finally which was examined by M. Theodore Martius, under the name of *gum kutera.* This gum is white, or of a honey colour, and farinaceous or silvery on its surface, in pieces which are flat and long rather than rounded, although it is sometimes rounded and mamillary. These pieces are of all sizes. It is less transparent than gum Arabic, less opaque than gum tragacanth; it is insipid, and crackles under the teeth. It is not soluble in the saliva like gum Arabic, nor does it form a mucilage like gum tragacanth.

When placed in water, it swells considerably, and is converted into a transparent jelly, which has no cohesion, so that it does not, strictly speaking, form a mucilage. When a greater quantity of water is added, all these gelatinous par-

ticles separate and fall to the bottom.   This want of cohe-
sion, and this complete insolubility of the gelatinous particles,
form the peculiar character of gum Bassora, and render it
unfit for the arts.   This jelly does not become blue on the
addition of iodine, at least it is not perceptible to the naked
eye ; this serves to distinguish it from gum tragacanth and
gum sassa.   Finally, another property of this insoluble jelly
is that it may be preserved longer without alteration than
any other substance of the same kind.   Gum Bassora is not
wholly composed of this insoluble substance, as we found
0.08 of a grain in the washings, very like gum Arabic.

The microscope also shows that it is organized in a wholly
different manner from the two preceding gums; when mixed
with water, with the addition of iodine, there may be seen:

1. Gelatinous, dense masses, of a mamillary appearance,
very slightly but uniformly of a bluish colour.   This mamil-
lary gelatinous substance forms the greater portion of the
gum, and probably gives it its distinctive characters; it is to
this I give the name of *bassorine.*   It here and there presents
some large, spherical isolated grains of fecula.

2. Other gelatinous parts presenting a ramified fibrous
structure ; the isolated fibres appear to be formed by the union
of transparent spherical granules. These are tinged of a yel-
low colour by the iodine.   Grains of fecula appear to be at-
tached to some of these fibres.

3. The liquid, in the midst of which the above substances
are found, presents a great number of very small, spherical
grains, of the same size, apparently very dense, and of a yel-
low colour. These grains appear similar to those which form
the fibrous structure, No. 2.   This same fluid also contains
large isolated granules of fecula.   Finally, there are some
compact masses of small yellow grains, fragments of dense
membranes, and ligneous fibres.

It is difficult to say what relation exists between the small
yellow spherical grains, or the fibrous structure formed of
them, the grains of fecula, and the mamillary gelatinous mat-
ter, which exist separately and in about the same proportions.
The yellow grains are probably organised ; the bluish gela-

tinous matter may only be the product of an excretion, and the grains of fecula may be derived from the parts of the vegetable traversed by the gummy juice, before excreting.

I must now say a few words on the origin of gum Bassora. M. Virey attributes it to a *mesembryanthemum ;* but the large size of some of the pieces, and the fragments of the bark of a tree which are found among it, render this supposition wholly inadmissable. According to Dr. Martius, this gum comes from India, and may be produced by the *Acacia leucophlæa,* Roxburgh; I, on the other hand, have often found it among gum Senegal, but, as has already been mentioned, I cannot say whether it came there naturally or accidentally.

Last year, a package was found in an old established drug store in Paris, lined on the inside with a cotton cloth, like those coming from India; this was labelled *bdellium from India*, and was filled with a peculiar gum, about to be described, mixed with a quantity of gum Bassora; it is therefore probable, that the origin assigned to it by Dr. Martius, is correct.

Gum Lignirode.—By the advice of my colleague, M. Chereau, I give this name to a peculiar product found among gums from Senegal and India, and which is formed of a soluble gum like gum Arabic, and of worm eaten wood.

Gum lignirode of Senegal.—This has already been mentioned in my "Histoire des drogues" under the name of *marrons de gomme,* (No. 794.) It is sometimes yellowish, but generally of a dark brown or blackish colour; it is dull, and the wood it contains is visible to the naked eye. I endeavoured for a long time to discover what was the cause of this mixture of worm eaten wood and gum ; but having observed that most of the pieces presented a large ovoid cell, which might have served as the habitation of the chysalis of an insect; I have supposed that this sort of mastic might have been made by the insect itself, as occurs in several species of the order of Hymenoptera.

Gum lignirode of India.—This is the substance in which the gum bassora was found, and which was labelled *bdellum from India.* It had the appearance of resin, but was reddish, and

when treated with water, all the gum was dissolved, leaving a
residue of worm eaten, very light, yellowish white wood.   It
was very hard and difficult to break, was tenacious under the
teeth, had generally a disagreeable and somewhat acrid taste ;
and presented some ovoid cells like the preceding, and others
which were smaller and more tortuous ; it contained more
fragments of wood internally than externally ; it also ap-
peared, though not so manifestly, to be attributable to insects.

In the *Annales de Chimie et de Physique* for March 1832,
will be found a memoir on the gums, in which the author
thinks that he has established that with the exception of some
hundredths of calcareous and other salts, that all gums are
composed of three immediate principles, viz: *Arabine, cera-
sine* and *bassorine.* I would state on this point, that long
before this chemist, but subsequent to M. Desvaux, I had
strongly insisted on the necessity of not confounding the *pro-
ducts* of plants with their *immediate principles*, and more espe-
cially in the gums. After having described in *L'Histoire des
drogues*, those of commerce, I divided them into five *chemical
species*, viz :—

1. Soluble gum of gum arabic and Senegal, and soluble
gum. (*Arabine.*)

2. Soluble gum of cherry, plum, &c.

3. Soluble gum tragacanth.

4. Insoluble gum of Senegal and cherry. (*Cerasine.*)

5. Insoluble gum bassora and soluble gum. (*Bassorine.*)

Perhaps I was wrong in separating the soluble gum of
cherry from that of Senegal, especially, as the insoluble gums
of these two kinds appeared identical ; but, at all events, it
would be very difficult for apothecaries, who daily dissolve
one part of gum arabic in even less than two parts of cold
water, to believe with the author of the memoir, that 100
parts of water do not dissolve, at the temperature of 77° more
than 18.49 of soluble gum, and only 24.14 at 212° F., and
moreover, it is at best an erroneous mode of fixing the solu-
bility of gums, on the greater or less facility with which the
solution passes through filtering paper.

From my recent experiments which confirm those I for-

merly made, I am convinced that gum tragacanth is formed of an organised, gelatinous substance, which swells in water and becomes infinitely divided in it, but the solution will not pass through a filter, and differs in all its characters from the soluble gum of gum arabic.—*Jour. de Chim. Med.*

ART. X.—ON OPTICAL CHARACTERS AS A DISTINGUISHING MARK OF THE DIFFERENT KINDS OF SUGAR.—By M. Biot.
(Extract.)

M. Biot, some time since, in his memoir on circular polarization, announced the curious fact that grape sugar, whether obtained from grapes or the numerous other vegetables which afford it, had the property of diverting the polarization of luminous rays towards the left, before it assumed the solid state, and of diverting them in an opposite direction as soon as solidification had once taken place, even when again dissolved in water or alcohol.

In investigating this property in other vegetable juices, M. Biot was led to conclude that such a sudden change in molecular arrangement did not take place in cane sugar, which always diverts the polarization towards the right, whether it be derived from the cane or from beets, carrots or other vegetables furnishing this sugar, and whether the experiment be tried before or after its solidification. These experiments, which serve as a guide in determining what kind of sugar may exist in the juices of different vegetables, also presented other interesting phenomena.

The juice of the parsnip, white carrot or turnip, obtained by pressure from the rasped root, after being boiled, produced double the rotation towards the right than before this process. This increase in the diversion of the rays of light, is produced by the development of the substance which M. Chevreul has termed *Amidine*, and which Messrs. Biot and Persoz have named *Dextrine*, from the property it so eminently possesses of directing the polarization of the rays of light to the right;

this substance constitutes the interior of the grains of fecula, from which it is disengaged by ebullition. It may be precipitated by means of alcohol from the liquids in which it is dissolved ; and when mixed with diluted sulphuric acid and boiled, it is converted into sugar.

Beet juice, as has already been shown by M. Pelouze, and which is confirmed by the optical experiments, contains crystallizable sugar only ; (10 to 14 per cent.) by treating it with alcohol, a white substance like dextrine is separated which is soluble in water, but is not gum, as it does not produce polarization to the left, nor is it dextrine, as it causes no deviation of the rays to the right. It would be interesting to examine this product, the formation or presence of which must necessarily have an influence on the manufacture of beet sugar.

The development of dextrine by ebullition in roots merits consideration, when a comparison of their alimentary properties is made ; for if, according to the observations of Leuwenhoeck, this substance alone is nutritive, it is certainly better to employ boiled rather than raw roots in feeding cattle, ebullition tearing or softening the envelopes of the utriculi which contain the nutritive substance, or dextrine.

The phenomenon of circular polarization having furnished a marked character by which it expresses the actual molecular arrangement of the bodies in which it occurs, Messrs. Biot and Persoz have pursued their investigations still further, and ascertained its applications in chemical reactions, where the subject of the experiment experiences successive modifications.

From numerous well conducted experiments, they ascertained that a limit of temperature exists between 194° and 201° F., where the rotatory force is at its maximum. Beyond this, or between 201° and 212° F., this force undergoes a sudden and great reduction ; ebullition continued for a certain time, reduces it still more ; after which, no prolongation of this process has any effect, provided the portions of fluid which are evaporated be replaced by the addition of water.

Acad. des Sciences.

ART. XI.—ON THE IODO-HYDRARGYRATE OF POTASSIUM.
By William Channing, M. D., of New York.

A CASE of severe affection of the lungs, of several months standing, which came under my care in February, 1832, assumed a few weeks afterwards, a character so serious as to destroy all hopes of recovery, unless by some new expedient the progress of disease should be speedily arrested.

Having already put into requisition unavailingly, the various resources of art sanctioned by respectable authorities, in the desperate circumstances to which my patient seemed reduced, I resolved to make trial of one of the iodides of mercury; medicines which, combining in a remarkable manner the active properties of their energetic elements, had frequently been a favourite subject of reflection, and (for reasons unnecessary here to particularize,) had to my mind promised much for cases of chronic pulmonary disease.

" Both these compounds," says professor TURNER, " are insoluble in pure water, but are dissolved by a solution of the hydriodate of potassa." They are both, and especially the deutiodide, soluble also in alcohol. But, as I had repeatedly experienced since the suggestions of LUGOL, the decided advantages of the hydriodate of potassa over alcohol as a solvent for the exhibition of iodine, it was adopted, with similar views in this instance, for the deutiodide of mercury, the more soluble of these mercurial compounds.

In thus preparing this medicine for exhibition, the physical changes which occurred were too remarkable to escape observation. I could not but be struck at once with the rapid disappearance of the brilliant red of the iodide of mercury, and the conversion to a straw colour of the clear colourless solution of the hydriodate of potassa, as the former was gradually added to the latter. Subsequently the mild taste of this solution of the deutiodide of mercury compared with its solution in alcohol, was a circumstance scarcely less likely to attract attention. At length, when on trial of their respective effects on the human system, a correspondent difference in the mildness of their action was manifest, the in-

ference was hardly to be resisted, that in this preparation the hydriodate of potassa acted a more important part than that of a mere solvent; or that in fulfilling this office, new affinities were developed, and new combinations formed worthy of investigation.

To determine this point more satisfactorily, a solution of the two iodides of mercury and potassium, at my request, was slowly evaporated by Mr. G. Chilton, operative chemist of this city, when beautiful prismatic needle-form crystals appeared of a bright straw colour, so deliquescent as to be maintained only in a very dry atmosphere, and perfectly soluble in water and alcohol in less than one-third their weight; thus demonstrating the validity of the inference above stated, and establishing the existence in this combination of a definite compound, a new salt, not yet adverted to by any chemical work published in this country.

On referring to foreign publications, it appeared from the *" Annales de Chimie,"* that this with other new salts had been discovered by Mr. P. A. de Bonsdorf of the University of Finland, in 1826, and subsequently noticed in an interesting essay of his, originally published in the *"Annalen der Physick;"* maintaining the position that chlorine, iodine &c., like oxygen, enter into combinations, forming both acids and bases; that thus, the chloride of mercury unites with the chloride of sodium in definite proportions, the former as an acid, and the latter as an alkaline base; constituting, (according to the nomenclature harmonizing with this theory,) chloro-hydrargyrate of sodium.

In conformity with these views, (now adopted by some of the most eminent chemists of Europe,) the salt under consideration is noticed by its discoverer under the appellation of "iodo-hydrargyrate of potassium," and without touching upon its analysis, his remarks are limited to a simple statement of the mode of its preparation, and its appearance when prepared, as one of the many illustrations furnished by his experiments in support of the chemical doctrine he would uphold. But as this preparation soon after my acquaintance with it, developed medicinal powers of no ordinary impor-

tance, a more particular examination of its constitution became a matter of interest. The following is the result of such an examination, sufficiently accurate for practical purposes.

By experiment I first ascertained that a solution of eight grains of the *pure* iodide of potassium in a small portion of water, (10 or 15 minims,) would combine with a fraction less than eleven grains of the deutiodide of mercury, maintaining the combination in solution, diluted with water or alcohol to any extent. If more than eleven grains of the deutiodide were added, although a small excess was dissolved in the concentrated solution, on diluting with water, it was promptly precipitated.

Now as 10.9 : 8 : : 450 : 330, or

1 atom deutiodide of mercury.....................450	} are as {	10.9 to
2 atoms iodide of potassium.......................330		8.

Add to these per estimate—

4 atoms combining water........................... 36   0.9

816   grs. 19.8

Giving as the constitution of the iodo-hydrargyrate of potassium,

4 atoms iodine	500
1 atom mercury	200
2 atoms potassium	80
4 atoms water	36

Atomic weight   816

From this statement it is evident, that in preparing this salt for exhibition, the labour of crystallizing it in order to obtain a solution of a definite strength is wholly unnecessary; inasmuch as a solution, combining a fraction more than eight grains of the iodide of potassium with eleven grains of the iodide of mercury, may be used as containing twenty grains of the iodo-hydrargyrate of potassium, the difference, if any, being too small to merit consideration.

But if it be desirable to obtain the preparation in a crystallized form, it is important that the definite proportions of the two iodides be observed, particularly that there be no excess of the iodide of mercury. For the *saturated solution of eight grains* of the iodide of potassium will dissolve and enter into combination with more than *thirteen grains* of the iodide of mercury, forming similar crystals soluble in alcohol, but

in water precipitating more than two grains of the iodide of mercury. Hence, by dissolving a suspected preparation in twenty or thirty times its weight of pure water, any excess of the iodide of mercury is immediately detected.

The *substances incompatible* with this compound, are the mineral acids, the fixed and volatile alkalies, with their carbonates, acetate of lead, nitrate of silver, sulphuret of potassa, and all preparations containing free chlorine. There appears to be no reäction exerted upon it by the tincture of galls. Its administration in metallic vessels should be avoided.

Am. Journ. Med. Sciences.

ART. XII.—REMARKS ON THE CULTURE OF SEEDS FOR, AND THE MANUFACTURE OF VEGETABLE OILS.

By C. V. HAGNER, Manayunk, Philadelphia County.

I was much pleased to find in the Journal of the Franklin Institute for November, an essay containing some useful hints on the subject of the manufacture of vegetable oils. I have long been astonished that a subject of so much importance to the agricultural, manufacturing, and commercial interests of our country, should be so long neglected, and that more attention has not been paid to it. I am perfectly convinced that there are many seeds from which oil for various purposes could be produced, and which could be grown with great advantage to the agriculturist. All that is necessary, is to draw his attention to the subject, and induce him to make the experiment. It is but a few years since the *Palma christi*, (Castor Bean,) was first grown in quantities in this country, yet the introduction of it here has had the effect, as almost every one knows, of improving infinitely the quality of the oil, and of supplying the market at from two to three hundred per cent cheaper than was paid for the nauseous and miserable stuff, formerly received from the West Indies and elsewhere.

One of the seeds mentioned by your correspondent, colchi-

cum* or rape seed, is of the greatest importance, and produces an oil which is, and has long been, much wanted for manufacturing purposes. This seed is grown abundantly in all parts of Europe, and the oil made from it is extensively used in the process of manufacturing cloth; it is, I believe, the cheapest oil they have, and takes the place of the common kinds of olive oil, which the manufacturers of this country are obliged to use at a great cost: this is a matter of considerable importance, when it is known that to every 100 pounds of wool carded, there is consumed from two to three gallons of oil. The rape seed oil is so cheap and abundant in Germany that it is much used in adulterating linseed oil; hence the bad quality of some of the German paint oils, as the rape seed oil does not possess the drying qualities of that from flax seed, and is therefore unfit for the purposes of painting, &c.

Having been for a long time engaged in the manufacture of flaxseed oil, and having made various experiments on other seeds, I have, of course, had some experience on the subject. In relation to rape seed I had an excellent opportunity of making full and satisfactory experiments. In the year 1822 or 1823, an English gentleman who was familiar with the culture of rape seed, and who had a farm somewhere in the neighbourhood of Salem, N. J., brought to my establishment about forty bushels of rape seed, which he had produced upon his farm. The account he gave me of its culture was this. Two acres were sown with this seed, (broad cast,) in the month of August; it sprouted, and was growing very handsomely, but late in the fall the cattle broke into it, and as he thought completely destroyed it; he abandoned the experiment, and suffered his cattle to roam in it all winter; but in the spring, observing it sprouting again, he put up the fence, and as he expressed himself, "let it take its chance." The two acres with this, as he considered it, unfair experiment,

* Should not this be colza, the common name for the *Brassica campestris,* from the seeds of which the colza oil is extracted? this is generally confounded with the true Rape oil which is procured from the seeds of the B. *napus.* The colchicum affords little or no oil.—Ed.

H

produced him about forty-four bushels of seed, for which I offered him four dollars per bushel, which he refused to take. I expressed it for him, and although my apparatus was not by any means perfectly adapted to the purpose, the manufacture differing in some respects not necessary to state, from that of flax seed oil, I produced three and a half gallons per bushel.

The cake, that is, the pulp after the oil is expressed from it, he valued highly for fattening cattle, and refused to take seventy-five cents per bushel for it; the oil he sold to a woollen manufacturer for one dollar and thirty cents per gallon; thus, including cake, realizing five dollars and thirty cents per bushel, out of which was paid the expense of manufacturing. It is, I am told, considered in England a profitable crop, although the price is not much, if at all, above two dollars per bushel. The gentleman was in high spirits as to the result, and told me he intended to go into the culture of it more extensively, but from what cause I do not know, I have never seen him or heard from him since—whether he failed in his after experiments, died, or returned to England, I do not know; I have not, however, the least doubt that our soil and climate are well adapted to the culture of this seed; it is of the same family with the cabbage, which every one knows grows luxuriantly here. We have, besides, such a variety of soils and climates in our country, that if it will not succeed in one district it certainly will in some other.

Another seed valuable for oil is the sun flower: I have never tried this, but am told it produces a very excellent salad oil; I have no doubt the culture of it, properly managed would be both useful and profitable.

The bene seed cultivated in the southern states, produces a valuable oil, and yields more than any seed I know of; it is said that one hundred pounds of seed produces ninety pounds of oil. I never tried the experiment fairly, but have no doubt as to the fact; some years since I expressed a barrel of the seed, but do not now remember the quantity produced; it was, however, such as to astonish me. The seed was eight years old, and had become in a manner rotten and rancid; the oil of course was not fit for the table, but it was, never-

theless, beautifully transparent and fluid, more so than any I had ever seen. It struck me that it might perhaps be valuable for watch makers. I believe I have a small quantity of it left, and should like some one who knows more of that matter than I do, to try it.

The common thin-shelled pig nut of our country, is said to make an excellent salad oil; the manufacture of it is easy; the shell is so thin as to interfere but little in the process; the nut is put into the mill, and ground up without removing the shell.

The cotton seed, if hulled, will yield a large quantity of oil, and I am glad to learn that attention is being paid to it. I once manufactured a small quantity, grinding the hull and cotton fibre with it; the quantity of oil produced in this way will not of course pay the expense of manufacturing it, so much of the oil being absorbed by the hull and cotton. Your correspondent does not appear to be practically acquainted with the plan of taking off the hull which he suggests, by means of a barley hulling machine. It is totally impracticable, for the following among other reasons: first, if the result could be accomplished in that way, the expense of power, labour &c. in so doing, would be such as to leave little or no profit; it would, in fact, be much more trouble and expense than all the rest of the process of making the oil: second, the seed cannot be hulled in that way; I speak from experience, being practically familiar with the process of hulling barley; the reason is, that when the grist is put into the machine, and the stone had penetrated through the hull, and come in contact with the soft and greasy parts of the seed, it would become so greased, or to speak technically, glazed, as to render it perfectly incapable of doing any more work; the seed would then come out in pretty much the same condition that it went in. I rather think that a method similar to that which is used in chocolate mills for separating the hull from the cocoa, would be more feasible. The nuts are broken up by being passed through rollers of a peculiar construction, and the shell is afterwards blown out by a common fan. The objections to this plan are, the difficulty of breaking up the

cotton seed, on account of its toughness; the further difficulty, from its adhesiveness, of separating the hull from the kernel of the seed. I have been told that some person at the south has succeeded in making a machine for hulling cotton seed, and I perceive among the list of patents in the Journal for November, one for a machine for that purpose; the description of it, however, is so imperfect that I cannot exactly understand the nature of it. If, as is said, it does hull one hundred and fifty bushels per day, it is an important matter, and the object is attained.

The above remarks have been hastily thrown together, after reading the essay above alluded to; they come from one who is in a measure practically acquainted with the subject, and may perhaps answer some useful purpose.

Manayunk, December 16*th,* 1833.

Journ. Frank. Inst. Jan'y, 1834.

ART. XIII.—REPORT OF THE COMMITTEE ON PATENT MEDI-CINES TO THE BOARD OF TRUSTEES OF THE COLLEGE OF PHARMACY OF THE CITY OF NEW YORK.

[As the report of the Committee of the Philadelphia College of Pharmacy on Patent Medicines, has already been given, (Vol. V. p. 20,) it would be mere repetition to insert those recipes adopted by our New York brethren from that report.]

The committee appointed by the Board of Trustees of the College of Pharmacy of the city of New York, on the subject of Patent Medicines, beg leave to report :—

That they have examined a number of recipes for some of the principal patent medicines sold extensively in this city and country. In this examination they have availed themselves of the labours of the Philadelphia College of Pharmacy, and as the formulæ for eight patent medicines, recommended in March, 1824, " to the adoption of their members as the standard recipes of that college," met with the entire approbation of

your committee, they have copied them, viz :—Hooper's Pills, Anderson's Pills, Bateman's Drops, Godfrey's Cordial, Dalby's Carminative, Turlington's Balsam, Steer's Opodeldoc and British Oil, to which they have added a recipe for Balsam of Honey, all of which they recommend to the adoption of this college as suitable formulæ for the preparation of the several remedies bearing the above titles.

BALSAM OF HONEY.

Take of Gum Bezoin,	5 oz.	
Balsam Tolu,	1 oz.	
Honey,	f 8 oz.	
Alcohol,	3 pints.	

Digest for 10 days and filter.

In these formulæ the weights, measures and preparations of the American Pharmacopœia are adopted.

The directions and recommendations which accompany these medicines, are in some instances of so marvellous and even so absurd a nature, that your committee are of opinion that some reform in this particular is also very much called for. The statement on these directions that the medicine is prepared in London &c., carrying as it does an unexplained falsehood, it would appear proper at least to state that they are now prepared in New York after the formulæ recommended by this college.

Your committee cannot take leave of the subject which they have been appointed to investigate without expressing their decided opinion that measures should be adopted to prevent, if possible, the countenance now so readily given to nostrums, the constituents of which are concealed from the public. They are of opinion, that among the members of this college these secret medicines should be entirely unknown. The number of these pretended medicines are constantly increasing, with perhaps no other merit to bolster them up than the unblushing quackery and marvellous pretensions of their inventors; who for the most part are influenced by the most sordid motives, regardless of the public health. It must be obvious also that it is much against the interest of the regular and qualified dealer to encourage and assist the sale of arti-

cles of this kind, as the profit allowed by the inventors or proprietors is generally much less than on regular prescriptions, and the well established drugs and compounds of the shop, which these nostrums, in a great measure supercede.

By these remarks your committee do not mean to say that new remedies may not be discovered, or new applications of well known materials, or a host of new and useful compounds, now wholly unknown and unsuspected : neither would they infer that the fortunate or scientific discoverer should not reap the benefit of his research. On the contrary they applaud the wisdom of that law which secures to the inventor of new and useful discoveries the pecuniary benefit arising from the exclusive use and profit of the discovery, for a certain term of years, upon his depositing in the patent office a full statement of his discovery, in order that, at the end of the time for which he has, as the reward of his invention, the advantage of exclusive profit, the discovery and its benefit may belong to mankind at large. In defence of this position, it will readily occur to you that many of the most valuable preparations of the pharmacopœia are modifications of patented compounds, found highly useful in the cure of disease.

In order that the members of this college may have the necessary information to judge of the utility of such new compounds, or to discountenance the quackery, where the proposed remedy may be deleterious or useless, we beg leave to suggest the propriety of appointing a committee, or making it the duty of some committee now existing, to obtain from the patent office at Washington, copies of the specifications of all new remedies deposited there, and report them, from time to time, to this college.

All of which is respectfully submitted.

OLIVER HULL,
JOHN CARL, Jr.   } Committee,
GEORGE D. COGGERSHALL, }

New York, 5th April, 1833.

ART. XIV.—ON THE MEDICAL USES OF THE VIOLA OVATA.

By Stephen W. Williams, M. D., of Deerfield, Mass.

Viola *ovata.* *Synonym.* *Viola primulifolia,* Pursh. Rattle snake violet. *Specific Description.* It is thus described by Nuttall. Leaves ovate, subcordate, crenate, rather acute, often lacerately toothed at the base; equally and for the most part conspicuously pubescent on either side, petiole marginated; scape shorter than the leaves; segments of the calyx subciliate; petals obovate, the two lateral ones bearded. On dry land. Flowers bright blue; flowers in April and May. (North American genera.) I have ventured to give it the English name of rattle-snake violet, from the fact that it is generally known here by the name of the rattlesnake plantain, from its efficacy in curing the bite of that reptile.

Medical use.—The fact which I shall relate with regard to its efficacy in arresting the direful effects of the bite of the deadly rattlesnake may be implicitly relied on. Dr. Wells, when living, was considered one of the most eminent, judicious, and observing physicians which Massachusetts has ever claimed. His medical precepts and opinions are treasured up by many of his successors with religious veneration.

Let it not be objected to the *Viola ovata* that we are not acquainted with the active principle of the plant which thus rapidly arrests the progress of one of the most terrible accidents to which humanity is liable. The principal substance which can be extracted from it is mucilage, and this is best done by infusion in water. It yields a greater proportion of it than any of the violets, and nearly as much as the same quantity of slippery elm, (*Ulmus fulva;*) hence it is much in use in dysentery, diarrhœa, strangury, and other affections of the urinary organs. Other medicinal qualities may reside in the plant, but I have not discovered them. I cannot persuade myself that its specific qualities reside in the mucilage, for other substances yield mucilage in greater abundance, and are not considered alexipharmic. We ought always to be governed by *facts* rather than speculative opinions. Who can explain the reason why variola vaccina protects the sys-

tem against the ravages of small-pox? and yet who can doubt
the fact? If we can establish the prophylactic qualities of
the rattlesnake violet upon as firm grounds, or if we can be in-
strumental in saving the life of a fellow being labouring un-
der the effects of the bite of this venomous reptile, our object
will be accomplished.

Many years ago rattlesnakes abounded in the vicinity of
this place. Since the land is cleared they are rarely to be
seen. Our old people were in the habit of using this violet
for their bites. They generally know it by the name I have
designated. The venerable Henry Wells, M. D., late of
Montague, successfully employed it in these cases. To his
statement respecting it I wish to draw the attention of physi-
cians. He was called to a patient who was bitten by a rat-
tlesnake, and who was labouring under all the symptoms of
a diffusion of the venom. His body was enormously swoln,
respiration laborious, and his skin livid. He immediately di-
rected a strong infusion of the rattlesnake violet, and con-
stantly bathed the wound and body with it. In a few hours
the tumefaction subsided, the febrile symptoms abated, and
the patient was considered nearly out of danger. He re-
tired to rest, and left directions with the nurse to give the
violet tea often during the night. The patient continued so
much better that the nurse became negligent, and omitted
the directions, and fell asleep. From this suspension of the
remedy the patient relapsed, and the febrile symptoms re-
turned, and the body was swoln like a puff-ball. The doc-
tor was called, and again directed the remedy as before
mentioned : the symptoms yielded, and from a continuance
of the remedy two or three days he completely recovered
without the use of any other means. Dr. Wells related the
above fact to my father, who was formerly a physician in
this town, and at the same time showed him the plant, which
my father perfectly recollected when I collected it for pre-
servation in my herbarium.

My grandfather, Dr. Thomas Williams, formerly of this
town, was in the constant habit of using a plant for the bite
of the rattlesnake, which he called the rattlesnake plantain,

and he was uniformly successful in the use of it.   His practice as a physician and surgeon was very extensive.   I have no doubt that it was the violet now under consideration.

I have within a few days ceased visiting a little patient who says that a short time before I was called to him he was bitten by a small green snake upon the top of his foot.   Not long afterwards he was attacked with pain in his leg, attended with considerable swelling and high fever.   I did not see him until he had been labouring under these symptoms some time.   When I first saw him I did not apprehend that the fever, tumefaction &c. proceeded from the bite of the snake, for I was not aware that its bite was venomous.   I put him upon the antiphlogistic plan of treatment, and applied the vegeto-mineral water to the inflamed leg.   The next day I visited him, and found his symptoms aggravated, and the swelling increasing.   I threw aside the mineral water, and directed emollient fomentations with the rattlesnake violet, and a poultice made with bran stirred into the liquor of the infused leaves.   The next morning I was highly pleased with the success of the applications.   The tumefaction had subsided, and the fever abated.   I left him under a confident expectation that he would soon recover.   In the course of the afternoon, however, an officious, intermeddling old woman sent word to the parents that my applications were improper, and that nothing would cure him but a cold application of the leaves of houseleek, (*Sempervivum tectorum*,) which was accordingly applied.   The consequence was a universal chill, succeeded by delirium, and an intense burning fever, from which he was not relieved under several days.   He was immediately attacked with pain and inflammation in the groin of the other leg, attended with a good deal of swelling.   I was immediately sent for, but could not go until the next morning.   I directed the violet fomentations and poultices again.   In about a fortnight suppuration occured, and I let out about half a gill of pus upon the tibia, about half way between the knee and instep.   The other leg continued swelled three or four weeks longer, when, by the continued application of the violet poultice, it subsided.

I

I have since used the infusion of this violet, and a fometa-tion with the leaves of it in an obstinate case of chronic in-flammation of the eyes, which had resisted the long continued use of a great variety of remedies. The patient had used the slippery elm and various other mucilaginous preparations with no success; in fact, with rather an aggravation of the complaint. Within a fortnight from the time she commenced with the violet infusion, no traces of inflammation about the eyes remained. So it appears it must be some other quality in the violet than its mucilaginous properties which must have effected the change. I am determined in future to use it extensively in the phlegmasiæ, both acute and chronic.

Am. Journ. Med. Sciences.

ART. XV.—ON CREOSOTE AND PICAMAR. By M. Reichenbach.

[Extract.]

Dr. Reichenbach has lately discovered a new substance in smoke, pyroligneous acid, and all kinds of tar, which he denominates *Creosote*. This substance, which floats on the surface of pyroligneous acid, can only be obtained pure by a complicated process. It is an oil of the consistence of that of almonds, without colour, transparent, strongly re-fracting the rays of light, and dispersing them even more than sulphuret of carbon. Its smell is penetrating and dis-agreeable, its taste burning and caustic, its specific gravity 1.037, its point of ebullition 460° F., and it does not congeal at 16° F., its fluidity not being altered at that low tempera-ture; when it is poured upon paper it diffuses itself widely, and forms a greasy spot, which disappears without leaving a trace, in a few hours. A drop placed on a plate of glass, completely evaporated in two or three days. In vacuo, it can be distilled without change or residue. It is a noncon-ductor of electricity. It has no action on the test papers.

With water it unites in two proportions, one containing 1¼ creosote to 100 of water, the other 10 of water to 100 of

creosote. Vinegar of beech wood contains $1\frac{1}{2}$ per cent. of it, and the tar 20 to 25 per cent. On being placed in contact with a great number of electro-positive and electro-negative substances, and with different salts and organic substances it manifests some interesting phenomena. For example, it is a better solvent than alcohol, for the resins, for colouring matters of a resinous nature, and especially indigo, which is not precipitated on cooling. With the white of eggs it instantly forms a solid body. Even when the albumine is dissolved in a large quantity of water, a drop of creosote will become surrounded with an envelope of hardened albumine, and fall to the bottom. It acts in the same manner on the serum of the blood, immediately concreting the albuminous portion, and enveloping the colouring portion, but without acting on the fibrine.

Fresh flesh plunged in a watery solution of creosote, and taken out in half an hour or an hour and dried, can afterwards be exposed to the action of the air and heat of the sun without fear of putrefaction. It becomes entirely dry in about eight days, when it is hard, brittle and possesses the smell of smoked meat. Creosote is doubtless the element which acts as a conservative principle on animal matters, when they are exposed to the influence of smoke, pyroligneous acid &c.

Pure creosote acts on animals and vegetables as a poison. The author has not yet made a quantitative analysis of this singular substance, but, from some experiments, judges that it is a hydrocarbonated body, surcharged with carbon, without azote, and perhaps without oxygen. Decomposed in a red hot porcelain tube, it afforded among other products, beautiful crystals of napthaline.

From the experiments of Dr. Reichenbach, it appears that creosote may prove eminently useful. As mentioned above, a solution of $1\frac{1}{4}$ of creosote in 100 of water will completely preserve meat from putrefaction. Even flesh which already exhales an unpleasant odour, is rendered sweet by plunging it for an hour in the solution of creosote. Fish can be admirably preserved in this way. Salted meat is much im-

proved by this process. The only disadvantage attending its use is the strong taste and smell of smoke which adheres to meat thus prepared; this, however, it is thought may be removed by vinegar.

The various properties possessed by this substance induced Dr. Reichenbach to suspect that it entered, as an integrant part, into a great number of thereapeutic agents, as Dippel's animal oil, tar water, the empyreumatic oil of Chabert &c. There has also been lately sold, at a very high price, a liquid imported from Italy, under the name of *Aqua Binelli*, which has the property of arresting hæmorrhages from the smaller vessels. Several chemists have attempted to ascertain its constituents, but without success, and Berzelius himself, in a letter to Mr. Græfe confesses, that notwithstanding the empyreumatic and ammoniacal smell of this liquid, that he found it impossible to form an exact idea of its origin, and that the substance in solution was unknown to him. The discovery of Dr. Reichenbach seems to throw some light on this question, and the peculiar action of creosote, even when in solution, on the serum and other parts of the blood, renders it very probable that the *Aqua Binelli* is nothing more than this substance dissolved in water, and united to some other of the products of a distillation of organic matters.

The same may be said with regard to the hemostatic liquids used in France and other countries. In Germany, a medicine prepared at Breslaw, and known under the name of *aqua empyreumatica*, is much used in diseases of the nervous system. It is prepared by saturating pyroligneous acid with chalk. This solution is subjected to distillation till half has passed over into the receiver. This is the *aqua empyreumatica*, and which, there can be no doubt, owes its properties to the creosote it holds in solution. Probably this article would be equally efficacious with the *aqua Binelli* to arrest hæmorrhages.

Dr. Reichenbach has tried the effects of creosote, both in a pure and diluted form in a variety of diseases, as cancerous affections, mortification, and caries; in the latter he has had the most astonishing success.

The same chemist has also discovered another product of the distillation of organic substances, which appears to be the bitter principle of pyroligneous acid, smoke and tar, and which he terms *Picamar.* This substance which crystallizes immediately when united to the alkalies, even with liquid ammonia, has some very peculiar properties.

Memor. Encyclop.

ART. XVI.—INFLUENCE OF COLOURS ON THE ABSORPTION OF HEAT, AND OF ODOROUS PRINCIPLES.

Read before the Royal Society, by JAMES STARK, M. D. of Edinburgh.—Extract.

The author observes, that the only experiments on record relating to the modifying effect of different colours on the absorption of heat from solar light, are those of Franklin and Sir H. Davy. In order to investigate this subject, the author employed pieces of wood, silk, and cotton, which were wrapped round the bulb of a thermometer placed in a glass tube ; the tube was then plunged into boiling water, and the time which elapsed during the rise of the thermometer from one given point to another, was accurately noted. Other experiments were also made with an air thermometer, of which the bulb was coated with various coloured materials, and heat thrown on the ball by means of polished tin reflectors from an Argand burner. The results accord very nearly with those of Franklin and of Davy, the absorbing power with regard to different colours, being nearly uniformly in the order of black, brown, green, red, yellow, and white. The author next investigates the differences which occur in the radiation of heat by differently coloured substances, a subject on which he is not aware that any experiments have ever been made previously to his own. The mode of ascertaining the amount of radiation was generally the converse of that by which the absorption of heat had been determined ; namely, by exposing the coloured substances, in contact with a thermometer, to cooling instead of heating processes. The general result of all his experiments was, that the loss of caloric by radiation follows exactly the same order, with regard to the colour

of the radiating surface, as its absorption. In the second part of this paper, the author gives an account of a course of experiments which he made with a view to discover the influence of colour on the absorption of odorous effluvia, and more especially in the case of the absorption of the fumes of camphor and assafœtida by woollen cloth of different colours. Black cloth was always found to be possessed of the greatest absorbing powers, and white of the least; red cloth being intermediate between them. Cottons and silks gave, on trial, precisely the same results, which were further confirmed by the different weights acquired by these substances from the deposition of camphor upon them.—*Proceedings of Royal Society.* [*Rep. Pat. Inv. and Journ. Frank. Inst.*

ART. XVI.—ANALYSIS OF AMERICAN COLOGNE EARTH.

By Thomas G. Clemson.

[Read before the Geological Society of Pennsylvania.]

There exists, near Philadelphia, on the land of Dr. Parrish, considerable quantities of a substance which has the following properties. It is found in amorphous masses, of a dark brown colour, having an earthy fracture, may be cut with a knife, which gives a waxy or resinous lustre to the parts separated, a lustre which may be obtained more perfect by burnishing. It is susceptible of being reduced to an impalpable powder. The vestiges of vegetable fibre have not yet entirely disappeared from it, proving its vegetable origin. When exposed to heat, the ordinary products obtained from organic distillation, are given off.

Ten grammes of a portion previously dried to 100° centigrade, (212° Fah.,) were calcined in a close crucible; the loss in water and bituminous matter, was 3.4 grammes. The remaining 6.6 grammes, were then heated, and at the same time exposed to the air. The earthy residuum weighed 5.57 grammes. From this, the composition in parts of unity is as follows:—

Volatile matter 0.340, Carbon 0.103, Cinders 0.557, = 1.000.

The cinders, or earthy matter, left after roasting were coloured of a reddish orange hue, owing to the presence of a little oxide of iron ; it might thus be employed as a pigment.

When in its natural state, and pulverized, it gives a fine brown colour, with all the intermediate shades between a dark and light brown, and may be used with glue or with oil, either of them drying and covering well. After calcination in close vessels, it is perfectly black, and might be used as a black for ordinary purposes, being peculiarly well adapted, when properly mixed, to the coating of iron for preventing oxidation, to ship painting, or the various applications of black pigments used in dressing ships. The small portion of carbon, and the excess of earthy matter, will be obstacles to its being employed as a combustible; however, experiment may prove its utility in burning lime, bricks, and in those cases where slow evaporation is required. A use which might grow out of its property of taking a polish under pressure and friction combined, would be that of painting paper, as a varnish upon stained papers very much increases their value. This matter might be employed to colour, and being susceptible of a lustre, would not require a varnish. The polish upon the French playing cards is obtained by rubbing the card with a little Marseilles soap, and then burnishing.

If employed alone, as a manure, it would not be attended with ameliorating effects, owing to its inalterability, but in a compost mixed with dung or lime, in the proportion of about one part of either of these substances to four or five of this matter, a fermentation would most probably ensue.

Another specimen of a perfectly similar substance was handed me for examination by Capt. Wm. Pell, and is found on his farm near New York, possessing all the properties of the preceding, save that the vegetable fibre in this case has entirely disappeared ; like the former, it gives off the characteristic odour of peat when burning. It contains—

Volatile matter 0.201, carbon 0.030, cinders 0.769=1.000.

The ashes were of a dirty gray colour ; the preceding observations are probably applicable to this second substance.

Journ. Franklin Institute.

ART. XVIII.—ON PLANTS FURNISHING BLUE DYES.

By M. Dierbach.

Colouring substances of a vegetable origin, are either of a resinous nature or are modifications of extractive matter. Among the resinous colours some are yellow as turmeric, gamboge, chica &c.; some red, as madder, dragon's blood, red saunders, safflower &c.; and some green, as chlorophylline, but it does not appear that there are any blues.

The blue colouring substances are generally of an extractive character; some of these extractive matters are also yellow as quercitron bark, fustic and many others, some red as alizarine, hæmatine &c. but there are no greens.

Vegetable blues may be divided into two sections. A. Blue colouring matters furnished by flowers and fruit, especially from the latter. These may be termed natural blues, because the colour is already formed during the life of the plant, as in the petals of the *Viola odorata, Iris germanica, Commelina communis, Sisyrinchium tinctorium, Aquilegia vulgaris, Centaurea cyanus, Campanula rotundifolia,* and a multitude of others. This colour also exists in the juice of the berries of the *Sambucus nigra,* in that of some varieties of the *Vitis vinifera,* in that of the *Vaccinium myrtillus, Rubus cæsius, Empetrum nigrum* &c.

B. Blue colouring matters furnished by the organs of nutrition from the root, the stem and the leaves. The colour is rarely primitive and formed during the life of the vegetable; it appears to be formed only after the death of the plant by chemical combinations, whence the name of chemical blues which have been given to these substances; to this section belongs the indigo of commerce. In the Leguminoseæ, blue colouring matter is afforded by the *Coronilla emerus, Vouapa simira, Baptisia tinctoria, Tephrosia tinctoria, Amorpha fruticosa, Robinia caragana, Ononis anil* and many others; in the Polygaleæ, by the *Polygala bracteata,* Forskalh, and P. *tinctoria,* Vahl, affording a kind of indigo; in the Cruciferæ, the most celebrated plant in this particular is the *Isatis tinc-*

toria, a blue colour can also be obtained from the leaves and stem of a variety of the *Brassica oleracea*, and the bark of the root of some kinds of the *Raphanus sativus*.

In the ACERINEÆ from the *Acer rubrum* which is used in America to dye cotton and wool; in the SYNANTHEREÆ, from the *Spilanthus tinctoria*, Loureiro, from which the inhabitants of Cochin China derive a dye closely allied to indigo. It is probable that a similar substance might be obtained from the S. *oleraceus*. In the POLYGONEÆ, from the *Polygonum fagopyrum*, if dried before the seeds are ripe; according to Thunberg, the P. *chinense*, P. *barbatum* and P. *aviculare* are cultivated in Japan, as plants affording a tinctorial substance of a rich blue, resembling indigo.

In the APOCYNEÆ, the *Pergularia tinctoria* from Sumatra, the *Gymnema tingens*, Sprengel, *Asclepias tingens*, Roxburgh, from Pegu, and the *Wrightia tinctoria*, Brown, *Nerium tinctorium*, Roxburgh, give highly esteemed blue dyes. In the LAURINEÆ, the roots of the *Laurus parvifolia*, Lamark, and of the L. *globosa*, Aublet, afford a violet colour.

In the EUPHORBIACEÆ, the *Crozophora tinctoria*, A. Jussieu, from which litmus is obtained, and the *Croton tricuspidatum* and C. *lanceolatum*, Cavanilles, give a blue; the common *Mercurialis perennis* contains a notable quantity of colouring matter, and the *Euphorbia helioscopia*, L., is used to stain paper of a sky blue. In the TEREBINTHACEÆ, the *Rhus mollis*, Humboldt and Bonpland, and the *Melampyrum arvense*, L., in the SCROPHULARIÆ, also give a good blue colour, as does also several species of *Rhinanthus* and *Euphrasia*.

It may finally be remarked that what only takes place after death in these phenogamous plants, occurs during life in some lichens and Boleti, which turn of a blue colour on being cut or bruised.   *Ann. der Pharm.* **1833.**

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Minutes of the College.

The Board of Trustees reported the election of John W. Swain, of New Orleans, as an associate member.

December **31, 1833.**

A letter of resignation from Isaac P. Morris was read and accepted on the usual terms.

A donation from M. Faraday, Esq. of his " Experimental Researches on Electricity," was received, and referred to Messrs. J. Scattergood and J. C. Allen to report thereon.

A donation was also received from Professors Wood and Bache, of the second edition of their United States Dispensatory, which was referred to Messrs. Wm. Hodgson, Jr. and E. Durand.

A communication on Egyptian Opium, from J. Scattergood, was read and referred to the author and Wm. Hodgson, Jr.

The committee of inspection were, on motion, requested to examine and report on certain opium offered in this market, supposed to be not genuine.

January **28, 1834.**

The committee to whom was referred " Experimental Researches on Electricity," made a report, which was accepted.*

The committee of inspection made the following report :—

That there appears to have been three lots of opium brought here, two from New York and one direct from the Mediter-

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* The great length of this interesting report, prevents its insertion at the present time.—Ed.

ranean, which claimed the attention of the committee.   Samples of two of the parcels are herewith submitted.   Of the third lot which was small, and none of which now remains in the market, the committee obtained no specimen.

No. 1.   Imported into this city from Leghorn, and sold as Egyptian opium, corresponds with M. Guibourt's description of that article in the following particulars:—It is in round, flattened lumps, generally smaller than those of Turkey opium, tolerably regular in their form and very clean upon their surface, appearing to have been covered with a leaf of which vestiges alone remain.   This opium is easily distinguished from the Turkey by its reddish colour, analogous to that of hepatic aloes, by its weaker odour, and being more adhesive when moistened.   It differs from the descriptions we have of the true Egyptian opium, in having a less shining fracture and in containing much less morphia ; and although the committee are not prepared absolutely to pronounce this to be a fabricated and spurious article, as it approaches so closely to the descriptions we have of Egyptian opium, in most of its characteristics, yet from its great inferiority in strength when compared with the best specimens of genuine Turkey opium, your committee cannot view without regret the attempt to introduce so inferior a substitute for one of the most powerful and valuable articles of the materia medica.

No. 2, was received in this city from New York, and the committee have been unable hitherto to learn the history of its origin.   It is evidently an inferior article, resembling in some respects the Benares opium occasionally brought to this market from the East Indies; it has most of the smell, taste and irregular granulated fracture of the Turkey opium, but differs in being of a much darker colour internally, and in externally presenting a totally different appearance.   It is entirely covered with a peculiar whitish gray crust, and presents an appearance as if the lumps, to prevent their adhering together, had been rolled in some kind of moistened clay and then dried.

The committee have ascertained from a manufacturer, who operated on both of them, that its product of morphia is about

fifteen per cent. less than that of good opium, and when to be had at a reduced price is by no means a disadvantageous article for the operative chemist. It is to be hoped, however, that it may not be introduced in any instance as substitute for the genuine Turkey opium, in any of the officinal preparations of that drug, except for the manufacture of morphia, as it is evidently a weaker and inferior article: about 300 lbs. have been sold here.

No. 3, consisted of less than 100 lbs. of inferior Turkey opium, selected from a case of a merchantable article brought from New York. M. Guibourt, in describing Smyrna opium, observes that it is sometimes mixed with a kind of opium in balls or round masses, which are hard and of an inferior quality; from what the committee can learn, they believe this parcel to have been of this identical character, presenting an appearance of inferiority, and sold at a less price.

WARDER MORRIS, } Committee
ELIAS DURAND,   }   of
CHARLES ELLIS,   } Inspection.

A communication from Wm. Hodgson, jr. on the Adulteration of Oxide of Zinc, as usually found in commerce, was read and referred to the committee of publication.

February 25, 1834.

The committee to whom was referred the second edition of the United States Dispensatory made the following report :—

TO THE COLLEGE OF PHARMACY.

THE Committee on the second edition of the U. S. Dispensatory, report :—

That they have given this edition a careful examination, with a view to ascertain the emendations or additions which have been introduced. They find it indeed, as the authors themselves say, by no means " a mere reprint of the first edition ;" but apparently the result of a careful and minute revision of the whole work. Many of the articles have received corrections or additions, in particulars more or less important, and some are entirely altered in their charac-

ter. We find also several new articles scattered through the body of the work, among which may be pointed out those on Coffee, Tannin and Tea, as possessed of considerable interest. The treatise on *Gum Arabic* is one of those which have received very material modifications, chiefly the product of recent researches, as obtained from several German authors of acknowledged authority. It will not be expected that your committee should enter into a detail of these alterations; but they will merely say, that they appear greatly to add to the practical value of the article on this subject.

Under the head *Acidum Arseniosum*, the authors have introduced the results of some experiments recently made by Dr. John K. Mitchell, and our Foreign Secretary, and published in the Journal of the College.

The article on *Citric Acid* has received a small addition in a notice of the falsification of this acid by the tartaric.

The notice of *Aconitum* is entirely altered, on the authority of Geiger, and this drug attributed to the *Aconitum nupellus*, instead of the *A. neomontanum*, as in the former edition.

The articles on *Althæa* and *Alum* have received considerable accessions.

Other alterations and additions might be enumerated, if necessary, to show the superiority of the present edition of this work.

But the elaborate treatise on *Cinchona* has received the most valuable accessions, in a series of descriptive notices, taken chiefly from Von Bergen's splendid Monograph of the Cinchonas, from Guibourt, and from Geiger's *Handbuch der Pharmacie*; and which are of very considerable value to the druggist and manufacturing chemist, inasmuch as they contain more minute descriptions of the different varieties of pale, yellow and red barks, and of the proportions of cinchonia and quinia contained in them respectively, than was before to be found, so far as your committee are aware, in any work in the English language.

The copiousness of the first edition left, perhaps, little to be desired in regard to the number and variety of articles composing the materia medica and strictly officinal preparations of

our own or foreign pharmacopœias; yet the physician, as well as the apothecary, could occasionally complain that some substances, either newly introduced and not yet possessed of established reputation, or of ancient date, though not quite obsolete, were to be sought in vain in its pages. To supply this deficiency, we here have an Appendix of forty-six very closely printed pages, containing notices of upwards of 200 articles not strictly officinal with us, that is, not designated in the United States or British Pharmacopœias. This appendix, in the estimation of the committee, is highly valuable; and they cannot refrain from adverting to a few of the articles composing it, as possessing particular interest.

Asparagus officinalis.—We are glad to see the sedative powers of this vegetable here vindicated. The authors mention a syrup prepared from the berries. We would take the liberty of intimating that a very fine extract may be prepared also from the berries, which appears to contain the active principle in a more convenient form.

Cheltenham Salt, artificial.—Under this head we find a notice of the formation of an artificial salt by one of our foreign members, the interest of which, as an instance of a successful and completely accurate imitation of a natural mineral water, will sufficiently warrant the introduction of the following extract from the description here given:—" Several artificial mixtures have been prepared, professing to be exact imitations of the saline ingredients in the chalybeate Cheltenham water; but the only one which appears worthy of confidence is that prepared by Robert Alsop, chemist, of London. The Cheltenham water, the composition of which is given at p. 104, under the head of *aqua*, is the pure *saline* of that name; but there is also a *chalybeate* Cheltenham water, and it is this that Mr. Alsop has so successfully imitated. According to Brande and Parkes, the natural chalybeate contains in the pint, carbonic acid 2.5 cubic inches; chloride of sodium (common salt) 41 grs.; sulphate of soda 22.7; sulphate of magnesia 6; sulphate of lime 2.5; carbonate of soda 0.5; oxide of iron 0.8: total 73.8 grains. The imitation of Mr.

Alsop, as analysed by Mr. Faraday, one of the first chemical authorities in London, contains the same solid and gaseous contents, except the sulphate of lime, which is very properly omitted ; and in the same proportions precisely, with the exception that there is about twice as much free carbonic acid in the artificial preparation. The iron is present in the state of protoxide, and is immediately dissolved by the free carbonic acid, upon adding a sufficient quantity of water to the mixed salts. The free carbonic acid probably exists as such in the dry mixture, as there is no obvious agent present to cause it to be disengaged in the mere act of solution."

The article on *Chlorine Ether*, a substance discovered almost simultaneously by Samuel Guthrie of Sackets Harbour, New York, and by the French chemist Soubeiran, and lately introduced into medical practice, possesses considerable interest. The same may be said of the notice of *Muriatic Ether*, though as a medicine the latter substance is, from its extreme volatility, not likely to come into general use.

Iodide of Zinc is noticed as affording a convenient preparation for some astringent injections, when employed in solution in the proportion of a grain to the fluid ounce of water.

Liquidambar *styraciflua.*—The peculiarly agreeable balsam obtained from this tree, in the warmer climates of the United States, claims a more extended reputation than has hitherto been granted to it ; and we are glad to see it brought into some notice in this appendix. It is certainly one of the most fragrant vegetable products of this continent, and appears to merit further investigation in a medical point of view.

The above are a few of the most prominent articles of the appendix, in addition to which the committee would point out the notices of *Cocoa*, Hydrastis *canadensis*, Phellandrium *aquaticum*, *Pæony* root, Saponaria *officinalis* and *Zedoary*, as of decided and obvious value. Indeed they regard this portion of the work as a very important accession to its practical usefulness, both to the physician and pharmaceutist ; and they may be allowed, in conclusion, to observe, that on a

comparison of the whole book with the former edition, they have found abundant evidence of the acute vigilance of the authors, and their unremitted anxiety to furnish to the medical and pharmaceutical communities a comprehensive manual, in equal advance with the present state of science, and honourable to the school of pharmacy of Philadelphia.

> Wm. Hodgson, Jr. }
> E. Durand,   } Committee.

Philadelphia, 2d *mo.* 24, 1834.

A letter of resignation received from Caleb Ash, was read and accepted on the usual terms.

Miscellany.

Test for chlorine in bromides.—M. Caillot proposes the chromate of potash as a test for the presence of chlorine in the bromides. This salt decomposes the bichloride, but has no action on solutions of the bibromide of mercury. The bromide to be tested, therefore, decomposed by a salt of mercury, and brought into the state of bibromide of mercury, as, for example, by subliming it with sulphate of mercury, mixed with a little peroxide of manganese, is dissolved in water and tested with a few drops of chromate of potash. · If any bichloride be present, a number of small red points of chlorate of mercury are immediately deposited.

Lœwig has proposed another mode. The dry mixture of chloride and bromide is heated in a stream of chlorine gas, and the vapours made to pass through caustic potash, by which chloride of potassium and chlorate and bromate of potash are formed. A solution of nitrate of silver precipitates the chlorine and bromic acid. A solution of caustic barytes digested on the moist precipitates, takes up the bromic acid only. The excess of barytes is separated by carbonic acid, and the bromate of barytes obtained by evaporation; or the barytic solution may be neutralized by nitric acid, and the bromic acid precipitated again by nitrate of silver.

Report to Brit. Association, 2*d meeting.*

Potash from felspar.—Fuchs has proposed to prepare potash for commercial purposes from felspar and mica. These minerals are to be reduced to powder, calcined in a furnace with quick lime, and afterwards exposed to air and moisture for some time; the alkali is then washed out. By this process, felspar should give about one-fifth of its weight of potash. *Ibid.*

Lime.—Mr. Andrews has given a very simple method of detecting the presence of barytes or strontian in lime. The whole is dissolved in nitric acid, evaporated to dryness, and the acid expelled by heating to redness in a platina crucible. The caustic residue is boiled with water, when the whole of the barytes and strontian and a little of the lime are dissolved. Sulphuric acid added to the solution shows if any of these two earths are present, while a boiling saturated solution of sulphate of strontian troubles it if it contains barytes, but causes no precipitate if the earth be strontian. *Ibid.*

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Oxide of Zinc.—M. Haldat has obtained crystals of oxide of zinc, of a honey colour, almost transparent, and of a rhomboidal form, by heating metallic zinc in an atmosphere of aqueous vapour, cautiously regulating the heat so as not to fuse the metal. By a similar process he has obtained minute groups of brilliant rhombohædral crystals of specular iron, equal in lustre and play of colour to that from Elba.

Schindler has also shown that a hydratted oxide of zinc may be obtained in crystals by uniting a rod of iron and zinc, and placing them in caustic ammonia in a close vessel. Gas is generated, and in a few days the inside of the vessel is covered with small transparent crystals, which are permanent in the air and consist of zinc 81.62, water 18.36.

Report to British Association, 2d meeting.

Gallic Acid.—Döbereiner obtains pure gallic acid in a few minutes by the following process:—A concentrated decoction of gall nuts, mixed with a little acetic acid to decompose the gallate of lime, is shaken for one minute with a quantity of ether. The gallic acid is taken up by the ether, and by spontaneous evaporation in a watch glass, is obtained in small colourless prisms. If longer digested the liquid separates into three portions. The lightest contains the gallic and acetic acids, if the latter be present in excess; the next, an ethereal solution of tannin, and the heaviest the water and extractive matter. *Ibid.*

Vegetable Alkalies.—Duflus has published a series of interesting researches on several of the vegetable alkalies. He has observed that bicarbonate of potash precipitates narcotin, but not morphine, and upon this property has founded a process for preparing them. He has also increased our knowledge regarding brucine and strychnine, and improved the process for extracting them from the nux vomica. He separates the two alkalies by digestion in absolute alcohol, which takes up most of the brucine, and afterwards boiling in water as long as a brown colour is imparted to the cold solution by a few drops of fuming nitric acid. This test is so sensible, that water is tinged when it contains only 1-12000 of its weight of brucide. Quinine he finds to fuse at 248° F., losing $4\frac{1}{2}$ per cent. of water; while cinchonine requires a temperature of 329° F., loses nothing, and is partly sublimed into crystals resembling benzoic acid.

Ibid.

Mode of testing Peruvian Bark.—The following method of testing Peruvian bark, given by Duflos, is highly deserving of attention. A drachm of the bark, finely powdered, is boiled for a few minutes with an ounce of water and half a drachm of concentrated acetic acid, the whole thrown on a filter, the residue washed with water, and the whole evaporated to dryness on a water bath. If the mass be still acid, it is dissolved again and evaporated, to drive off all the acetic acid, the dry mass is digested

in absolute alcohol, the solution freed from colouring matter by animal charcoal, and precipitated by bichloride of platinum, added drop by drop, as long as any deposit takes place. The precipitate washed, dried in the air, and weighed, corresponds to half its weight of the vegetable alkali. The precipitate is soluble in water, and is a double salt, consisting of one atom of bichloride of platinum with one atom of a muriate of the vegetable alkali. *Report to British Association, 2d meeting.*

Test for Cinchonine in Sulphate of Quinine.—Kindt gives the following method for detecting the presence of cinchonine in sulphate of quinine. A grain of the salt in fine powder is shaken with one drachm of ether, and a drachm of ammonia is added, and the whole well shaken. If no cinchonine be present, the line of separation between the two fluids is clear; if the smallest quantity be present, it is deposited at this line.

Ibid.

Atropine—Hyoscyamine.—Brandes states, that if leaves of belladonna be distilled with water and caustic lime, a liquid passes over, which, besides the smell of ammonia has also that of the fresh plant. By saturation with muriatic acid, evaporation to dryness, treating with alcohol, evaporating this solution, and distilling the dry mass with a little water and caustic lime, an alkaline poisonous liquid is obtained which in the open air speedily decomposes. *Ibid.*

Lactic Acid.—Mitscherlich gives the following process for preparing pure lactic acid. Lactate of lead prepared in the usual way, is decomposed by sulphate of zinc, the sulphate of lead separated, and the lactate of zinc crystallized by evaporation ; at first it is yellow, but by repeated crystallizations is obtained of a pure white. The solution of this lactate decomposed by caustic barytes, the oxide of zinc separated, and the lactate of barytes which is in solution decomposed by sulphuric acid and evaporated, gives a clear colourless syrupy acid not volatile, but decomposing and leaving a residue of charcoal when heated to a sufficiently high temperature. *Ibid.*

Bubuline.—Morin has extracted from cow dung a substance to which he has given the name of bubuline, and which he considered to be the ingredient to which the utility of cow dung as a mordant is owing. It is obtained by taking up the soluble parts with water, evaporating to dryness, treating the extract-like matter with ether and alcohol, after which water dissolves the bubuline. It is precipitated by alum, by acetate of lead and by sulphates of copper and iron. The soluble matter in dry cow dung amounts to about 20 per cent., of which the bubuline constitutes upwards of one-fourth. *Ibid.*

Naphthaline.—Brocke has shown that naphthaline may be prepared in large quantity by distilling coal tar with water, chloride of lime and sulphuric acid. *Report to British Association,* 2d *meeting.*

Elardic and Palmic Acids.—Fat and drying oils are distinguished by the remarkable property first noticed by Pontet—that when mixed with an acid nitrate of mercury, or with hyponitric acid in small quantity, they speedily become solidified. Boudet has lately investigated this subject, and found the solid thus obtained to possess peculiar properties. He has proposed, for that obtained from olive oil, oil of almonds, cocoa nuts &c. the name of *Elardine,* and for that obtained from palm oil, *Palmine.* Alkalies changed these substances into elardic and palmic acids respectively, and glycerine. Muriatic acid separates the acids from the alkalies in the form of an oil which solidifies on cooling. They possess decided acid properties, and may be distilled without decomposition. *Ibid.*

Bismuth expansion of, on becoming solid.—Marx has established a very important fact, in regard to melted bismuth. He finds that at the moment of solidifying, it expands 1-53d of its volume. He considers also, that like water it has in the fluid state a point of maximum density. Antimony and lead do not expand at the moment of congelation, as was formerly supposed, so that water, bismuth and cast iron, are the only bodies which possess this property; and in regard to cast iron it is still doubtful.

Zinc contracts greatly; potassium also contracts, and arsenic at least three times as much as bismuth expands, if we may judge from the fact, that a mixture of one fourth of its weight of arsenic prevents bismuth from expanding on becoming solid. *Ibid.*

Dried Herbs.—Mr. Lindsey, the intelligent manager of the gardens at Chiswick house, has just presented to the Medico-Botanical Society some very beautiful and well preserved specimens of dried plants and herbs, retaining in a peculiar degree the whole of the volatile oil and aroma, and the colour of the recent plant. The plan adopted by Mr. Lindsey is to dry the plants in a close and dark room, and not as is usually the case, by exposure to a current of air and the action of light. When the separation of the aqueous particles is effected by their evaporation, and they are tolerably dry, he submits them to pressure in small quantities enveloped in paper, until the oil appears on the surface, and which is known by its discolouration; by this, all change of colour by the action of light, or further loss of volatile matters by evaporation, is prevented. In potherbs, as well as medicinal plants, the improvement and superiority is very decided. *London paper.*

Palm Oil.—This substance may be deprived of its orange colour by the following process, given by M. Michaelis :—A certain quantity of the coloured oil is to be melted in a copper vessel over a mild fire; when it is quite liquid, one-sixteenth of its weight of finely pulverized peroxide of manganese is to be added to it. The oxide and oil kept over a moderate fire for five or ten minutes and continually stirred; boiling water equal to half the weight of the oil is to be added, and the whole boiled, after which one-thirty-second part of the sulphuric acid of commerce is to be very cautiously and gradually mixed with it; after stirring for some time, the mixture is to be permitted to cool. The oil collects at the top, whilst the peroxide of manganese sinks to the bottom. This oil has a yellowish colour, which, if the operation has succeeded properly, has a green tinge like olive oil; on being subjected to the action of the air and light, it soon becomes as white as hog's lard. When employed to make soap, it gives a very white product, and when burnt does not clog the wick with charcoal, as is the case before it is purified.   *Poggen. Annal.* 1833.

Disinfecting Powder.—The following process is recommended by Keist, of Berlin, for the preparation of a powder, which from the property it enjoys of giving off oxygen and acetous vapour, for a long time, is well calculated as a disinfecting agent. Take acid sulphate of potash 410 grammes, subacetate of lead 70, manganese 30. Reduce these three substances, separately, to a fine powder, mix them in a proper vessel. These quantities are sufficient for the purification of a large room.

Pharm. Centralblatt. **1833.**

Purple Powder of Cassius.—The following method of preparing this beautiful colour is extremely simple and always successful. Neutral chloride of gold in crystals, obtained by evaporating a solution of gold in aqua regia, is to be dissolved in 500 or 600 times its weight of pure water, to which is to be added two, three, four or five per cent. of fuming hydrochloric acid, according as the colour is wanted of a lighter or darker shade. In this solution is there to be placed a rod of pure tin. After the expiration of a few days, the purple is precipitated and may be separated by the filter or by decantation. The tint of the purple depends on the quantity of free acid in the solution, being pale in proportion as the acid is in excess.   *Journ. Fur. Tech. Chem. No.* **3.**

Purification of Linseed Oil.—The mode of purifying linseed and other oils, by means of sulphuric acid, washing with water and filtration, devised by Thenard, presents some serious difficulties in practice. First, the operation requires a large establishment and much time; secondly, it is sometimes very difficult to remove all the sulphuric acid used to purify the oil; finally, the oil retains much water, which can only be driven off by the application of a high temperature. A manufacturer of oils in Ger-

many has proposed to treat the vegetable oils in the following manner :—
They are to be mixed with sulphuric acid and well stirred, and then per-
mitted to stand till all the black flocculæ are deposited. A thick mixture
of chalk and water is then to be added in small portions, stirring the
mass well after each addition. When chalk sufficient to saturate the
acid has thus been mixed with oil, this latter is to be poured in vessels,
to permit the precipitates to fall to the bottom. After standing some
hours, the oil is to be filtered. By this plan all the washing is avoided,
an operation that requires ten or twelve days, and no loss is experienced,
as the chalk, from being previously saturated with water, does not absorb
any oil.   *Memorial Encyclop.*

New Orange Colour.—Take two parts by weight of sulphate of barytes,
one part of sulphuret of antimony of commerce, and one part of dry char-
coal. Pulverise these three ingredients very finely, and mix them tho-
roughly. This mixture is to be firmly pressed into a black lead crucible,
which should have a cover; the crucible is to be placed in a furnace and
kept at a red heat from one and a half to three hours according to its size.
It must not be opened until it is entirely cool, as the sulphuret of barium
and charcoal would immediately take fire. The cooled mass is to be pulver-
ised, mixed with boiling water, and the solution filtered. The carbonaceous
matter remaining on the filter is to be well washed with warm water, and
after drying can be used for another operation. The filtered liquid is of
a pale yellow. Sulphuric acid is to be added to it as long as any orange
precipitate takes place. This precipitate is collected, carefully washed
with pure water, and dried slowly. The great secret in the manufacture
of this colour is the management of the fire, as the heat should not be
used longer than is merely sufficient to the decompose the sulphate of
barytes, otherwise there is a great loss of materials. With five pounds of
sulphate of barytes, two and a half of antimony and of charcoal, two and
three quarters pounds of colour are obtained at the first operation. This co-
lour covers well, and gives brilliant tints.   *Ibid.*

Formation of Crystals of Sulphuret of Lead.—It is well known that sul-
phuret of lead, or galena, is volatilised at a certain temperature, and by
sublimation affords octahædral or cubical crystals. Hence it was sup-
posed that the veins of this substance found in the earth had an igneous
origin, but as galena is found in all formations, even the most recent se-
condary, whose aqueous origin is fully established, there can be no doubt
but that it must have been produced in the same manner. Hitherto, how-
ever, chemistry had pointed no mode in which crystals of sulphuret of
lead could be formed in the moist way. M. Becquerel, who by aid of
electro-chemistry, had succeeded in imitating many natural compounds,
which had hitherto never been artificially formed, conceived the idea of

employing the same method with galena, and was completely successful. He took a tube closed at one end, of about a quarter of an inch in width and four inches long. The lower part of the tube was filled for about one-eighth of an inch with sulphuret of mercury, on which was poured a solution of chloride of magnesium, and a strip of lead introduced. The apparatus now was hermetically sealed, and remained undisturbed for a month or six weeks, at which time crystals of a regular tetrahædral form made their appearance, having all the properties of galena.

Memorial Encyclop.

New Chlorometer.—This consists, according to its proposer, M. Pouillet, in adding to the solution containing chlorine, a certain quantity of powder of silver obtained by precipitation; there is instantly a formation of chloride of silver, which precipitates and becomes mixed with the excess of the metallic powder. If this powder be weighed before the experiment, and again afterwards, the augmentation of its weight will exactly represent that of the chlorine in the liquid. If the chlorine, instead of being in a free state, is in combination with an oxide, forming a chloride, the powder of silver will still absorb it, but more slowly; the operation may be hastened by acidifying the solution with an acid capable of forming a soluble salt with the base of the chloride, as the hydrochloric or acetic. This mode will enable any one to estimate exactly the quantity of useful chlorine in the alkaline chlorides so generally employed in the arts as disinfectors. A comparison of this mode with that of Gay Lussac, proves that we constantly obtain from one-fifth to two-fifths more chlorine by the latter than by the former. This has led M. Pouillet to conjecture, that the indigo proof used may sometimes be badly prepared, or undergoes alterations. The liquid chlorides, as the *eau de javelle* and chloride of soda, from the best makers, never afforded the author more than thirteen grammes or four litres, .903 of chlorine in the chloride of soda, and six grammes or one litre .903 in the *eau de javelle* to the litre of chloride. *Ibid.*

Extract of Logwood.—This article is prepared in Mexico and Yucatan in considerable quantities, and does not appear to deteriorate by age or atmospheric influence. Ten or twelve pounds of it are equal to about a hundred of the wood. Thus, a case two feet long, by fifteen inches in breadth and six in depth, weighing eighty pounds, will represent six hundred and sixteen of the wood. The extract is readily soluble in warm water, and affords a richer dye than can be obtained from the wood of commerce. It is well deserving the attention of manufacturers.

Ibid.

Lucifer Matches.—The following mode of making these is very simple, and much less dangerous than other plans in use:—Take of chlorate of potash twelve parts, sulphuret of antimony four parts, animal glue or gum tragacanth three parts, and as much water as will suffice to bring the mixture to the consistence of a thick paste. The sulphuret of antimony is to be pulverised first, and the water with the glue or gum in solution added to it and well incorporated, when the chlorate of potash is to be gradually added. The antimony and chlorate must never be rubbed together in a dry state, as an explosion would be the result. The matches which are to be plunged in this paste, should be previously dipped about six or eight lines of their length into melted sulphur. The paper which is used to inflame them, is made by coating strong paper with fish glue, and covering this with a layer of very finely pulverised glass.

Memorial Encyclop.

Properties of Codeine.—From experiments made on animals, Mr. Kunkel concludes:—1st, that the action of codeine differs from that of morphine, in not paralysing the posterior extremities, and that the salts of morphine, and morphine itself have no other effects than those of a stupifying character; 2d, that codeine, on the contrary, appears to possess a very marked exciting power; it causes convulsions in the limbs and muscles of the neck; and when it causes death, it evidently exercises its chief action on the cerebellum and spinal marrow, which are found gorged with blood, the animal before its death always moving backwards. Codeine affects the organs of circulation, inflames the parts with which it comes in contact, acts more powerfully when introduced into the cellular tissue than into the stomach; is absorbed, and finally would seem to enjoy a special action on the urinary organs, suspending the excretion of urine; 3d, its action differs from that of the watery extract of opium, in not paralysing the lower limbs, but is analogous to it, in being more energetic on the cellular tissue than on the stomach, and in accelerating respiration and circulation. *Revue Medicale.*
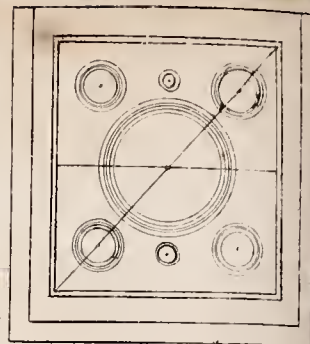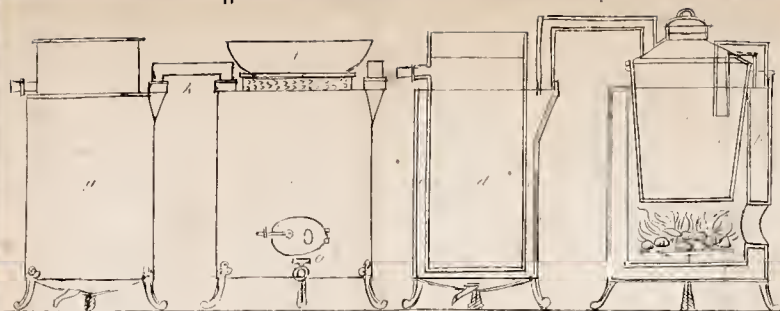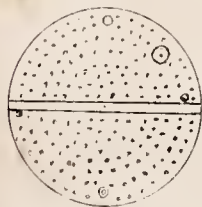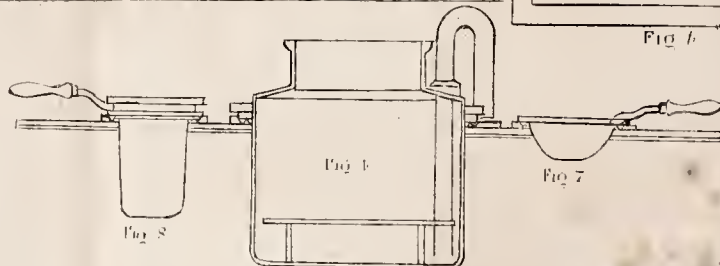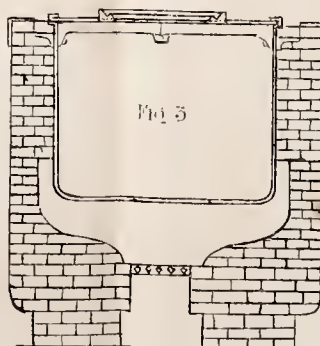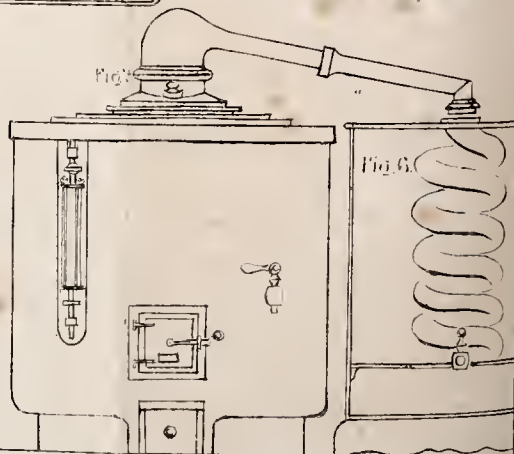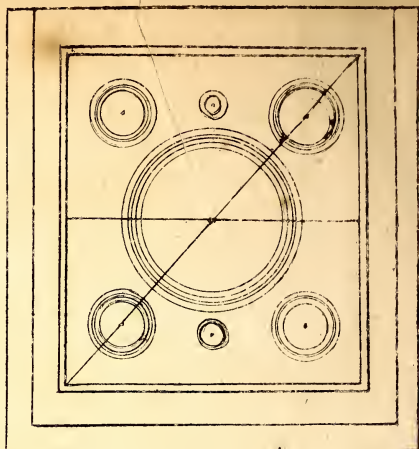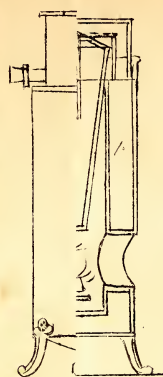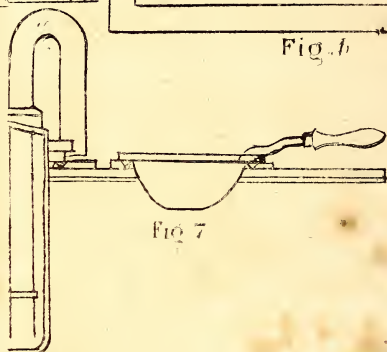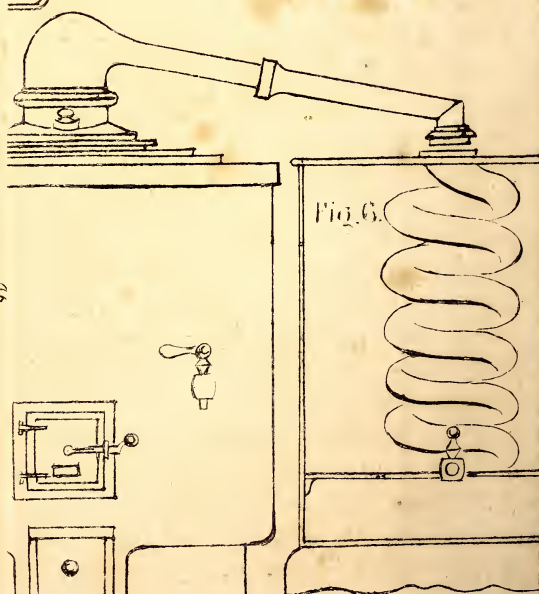
Fig. 1   Fig. 2

Fig. 3   Fig. 4   Fig. 5   Fig. 6   Fig. 7   Fig. 8   Fig. 9

Fig. 5

Fig. 7

Fig. 6

Original Communications.

ART. XIX.—APPARATUS FOR FREEZING WATER BY THE AID OF SULPHURIC ACID.

By R. Hare, M. D., Professor of Chemistry in the University of Pa.

The congelation of water by its own vaporization, accelerated by exposure to the absorbing power of sulphuric acid, or other agents, in vacuo, has always been a difficult experiment. A distinguished professor complained to me lately of want of success in his efforts to repeat it. In November, 1832, after having three times succeeded in freezing water by the process in question, yet having failed before my class, I was led to give more than usual attention to the process in order to obviate the causes of disappointment. It appeared to me that the failure arose from imperfection in the vacuum. An excellent pump, with perfectly air tight cocks, is indispensable; and not only must the pump be well made, it must likewise be in good order. Neither should the packing of the pistons, the valves, nor the cocks, allow of the slightest leakage. If a pump has been used previously for freezing, by the vaporization of ether, it will not be competent for the experiment in question, unless it be taken apart and cleaned.

Cocks of the ordinary construction are rarely if ever perfectly air tight, and their imperfection always increases with

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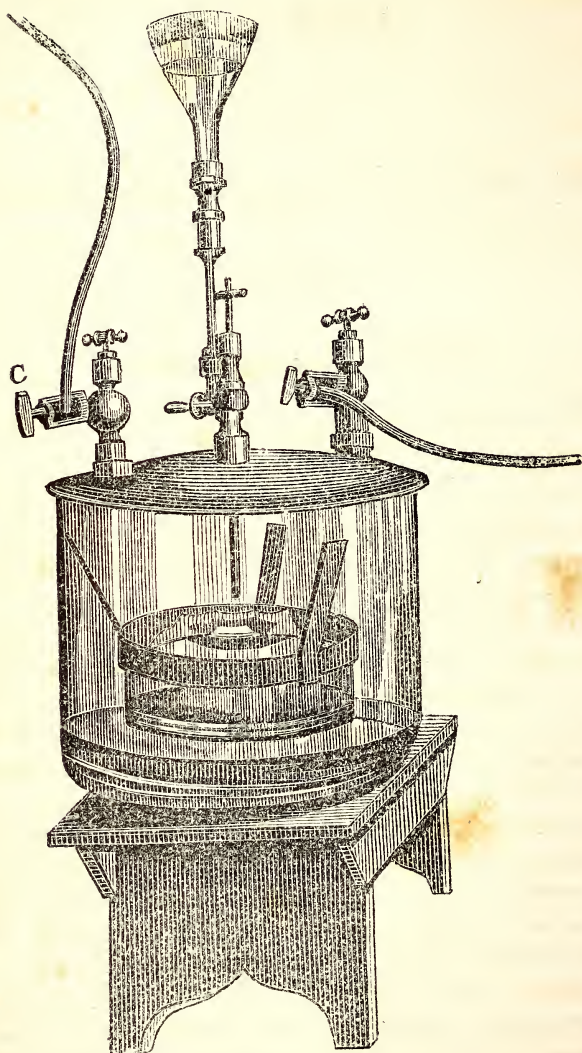
wear. Under these impressions, having cleansed my air pump, and put it into the best order possible ; for the purpose of obviating leakage through the cocks associated with the instrument, I closed the hole in the centre of the air pump plate by a screw, and for a receiver made use of a bell glass with a perforated neck furnished with a brass cap and a female screw, by means of which one of my valve cocks was attached. A communication between the bell, and the chambers of my pump, was established through the valve cock and a flexible lead pipe, in a mode analogous to that already described in the account of the valve cock. In this way I succeeded in preserving the vacuum, longer than when the cocks of the air pump were employed in the process ; and accomplished the congelation of water by means of the vacuum, and sulphuric acid.

Latterly, I have used an apparatus which is represented by the adjoining figure, in which a brass cover is made to close a large glass jar so as to be quite tight. In operating, the bottom of the jar was covered with sulphuric acid, and another jar with feet, also supplied with acid enough to make a stratum half an inch deep on the bottom, was introduced as represented. The bottom of the vessel last mentioned, was, by means of the feet, kept at such a height above the surface of the acid in the outer jar, as not to touch it. Upon the surface of the glass vessel, a small piece of very thin sheet brass was placed, made concave in the middle, so as to hold a small quantity of water.

The brass cover was furnished with three valve cocks, one communicating with the air pump, another with a barometer guage, and the third with a funnel supplied with water. Under these circumstances, having made a vacuum on a Saturday, I was enabled to freeze water situated on the brass, and to keep up the congelation till the Thursday following. As the water in the state of ice evaporates probably as fast as when liquid, during the night the whole quantity frozen would have entirely disappeared, but for the assistance of a watchman whom I engaged to supply water at intervals. At a maximum I suppose the mass of ice was at times about

two inches square, and from a quarter to a half an inch thick. The gradual introduction of the water, by aid of the funnel and valve cock, also of the pipe represented in the figure, by which it was conducted to the cavity in the sheet brass, enabled me to accumulate a much larger mass than I could have produced otherwise. The brass band which embraces the inner jar near the brim, with the three straps proceeding from it, serves to keep this jar in a proper position; that is in fact concentric with the outer jar.

In this last mentioned experiment, I employed an air pump upon a new construction, which I have lately contrived, and of which I shall soon publish a description.

ART. XX.—MINUTES OF AN ANALYSIS OF SOUP CONTAINING ARSENIC,

Which occasioned the death of a lady in the city of Baltimore; together with the chemical examination of the stomach of the deceased and its contents. By Dr. James B. Rogers, Geo. W. Andrews and Wm. R. Fisher, Associate Members of the Philadelphia College of Pharmacy.

From a conviction that much remains to be learned in arriving at a certain conclusion respecting the presence of arsenic in suspected fluids; and that in accordance with the present enlightened system of philosophy, rules can alone be formed from the inductions drawn from a large collection of facts, we have been induced to lay before the public the details of an analysis prosecuted in a case of suspected poisoning, in which we were engaged, in consequence of a recent melancholy occurrence in this city.

Several days had elapsed after the death of the unfortunate sufferer, when we were presented with about two ounces of a fluid, contained in a mustard bottle, which was represented to us as a portion of soup reserved from some that had been eaten by her, several days before death, so that probably eight or ten days had passed since its preparation. It was said to have been squeezed through a rag to separate

the rice and other solid contents. The reaction on portions of this fluid of several common fluid tests, rendered it highly probably that *arsenic* was contained in it, and hence the following minute examination was induced. From the very indefinite manner in which the details of these examinations are usually given in the books, we are led (in the hope of rendering our labours available to others) to report our experiments in their most minute details.

1st. The fluid above mentioned having been filtered through paper, about a fluid drachm was evaporated to dryness, in a clean glass vessel. A portion of the extract produced, exposed on burning charcoal, gave an empyreumatic odour, succeeded by an alliaceous smell, which was pronounced identical with that arising from a minute portion of arsenic (arsenious acid) exposed on coals in a similar manner.

2d. The remainder of the extract, mixed with black flux, and placed in a clean test tube, was exposed to a red heat, and the sublimed matter presented a defined edge or ring, about half an inch above the surface of the flux, having a steel gray lustre.

3d. The paper employed in filtering the soup containing the residua separated thereby, was then washed with two ounces of boiling distilled water. One and a half drachms of this solution, when tested with ammoniacal nitrate of silver, gave a lemon coloured precipitate, which was completely redissolved by the addition of liquid ammonia.

This test of the ammoniacal nitrate of silver is considered liable to deceive, from the resemblance in colour of the precipate to that produced by salts of phosphoric acid. We think, however, that a practised eye will readily distinguish them. It is well known that all the insoluble phosphates are thrown down in an exceedingly light bulky form, diffused through the liquid, while the arsenical salt at once falls heavily to the bottom of the vessel, with every indication of its metallic character. We should feel inclined to attach considerable value to this test, provided other corroborating appearances concur.

4th.   A small portion of the soup, when diluted with a portion of solution No. 3, and a current of sulphuretted hydrogen gas passed through it, furnished an intense lemon coloured precipitate.

5th.   A further portion of the soup, evaporated to dryness, and the extract mixed with black flux, was placed between polished copper plates, and the plates securely bound together by wire.   These plates were then exposed to heat in a charcoal fire; when cooled and separated the upper plate was found coated with a brilliant whitish metallic deposite of sublimed matter.

6th.   The experiment for reduction was again made, (substituting boracic acid and charcoal, as recommended by Rose, of Berlin, in place of black flux,) with an extract obtained by the evaporation of a small portion of the soup.   The result was, a sublimed ring of specular metallic crystals, about an inch from the lower end of the tube beyond which a pale yellowish matter was condensed.

7th.   The precipitate from sulphuretted hydrogen (experiment No. 4,) having been carefully collected on a filter, washed with distilled water and subsequently dried, could not be submitted to the test of reduction, in consequence of the close adhesion of so small a quantity to the paper.   This paper when burnt, however, yielded a distinct alliaceous odour.

8th.   The remaining portion of the soup was then evaporated to dryness, mixed with black flux and submitted to the usual process for reduction.   In the first instance, so much of the oxide of lead in the glass was reduced as to deceive us into the belief of a large metallic ring having been formed below its usual situation.   The subsequent application of heat, however, to the ring, caused it to ascend in vapours and condense higher up in the tube, in the form of crystals, having a metallic lustre.   Heat having been again applied, the fumes manifested an evident alliaceous or phosphorated odour. The tube was now hermetically sealed, and one end exposed to the heat of a spirit lamp in an inclined position, so that the

sublimate was collected in the upper end in the form of brilliant crystals.

9th. Crust No. 6 was sublimed higher in the tube, then the part of the tube containing the flux withdrawn, and the end sealed. About half a drachm of distilled water was now poured in, and two drops of ammoniacal sulphate of copper introduced by a glass rod, and the tube set aside. On subsequent inspection, the colour of the precipitate was not so decidedly green as to be confidently considered arsenical.

A caution is given in the books which we here repeat, that very nice discrimination is requisite, that the experimenter may not be deceived by the precipitation of peroxide of copper, which is apt to occur when the ammoniacal salts of copper are poured into a solution. The colour of this oxide being a faint blue, the least yellow reflection on it gives it a pea green colour.

10th. A small galvanic circle was arranged agreeably to the plan of Fischer, of Breslaw, and a portion of solution No. 3 was poured into the inner glass vessel, and the apparatus set aside. Twenty-four hours after, on inspecting the negative pole, the copper rod was found evidently coated with a silvery white deposite, and a whitish precipitate diffused throughout the solution in which it was immersed. These appearances corresponded with a similar experiment in which twenty drops of Fowler's solution were employed.

This small piece of apparatus is of so easy construction that we furnish a cut of it at the end of this article, as arranged by us.

A further account of this may be found in Dr. Christison's treatise on poisons, article *Arsenic.*

11th. A current of sulphuretted hydrogen gas was passed through the remainder of solution No. 3. The yellowish, or lemon coloured precipitate, which fell, was mixed with that obtained in experiment No. 4, and the whole was carefully evaporated to dryness. The mass was exposed to the experiment for reduction, with a flux composed of charcoal and dried carbonate of soda; two metallic rings were sublimed, which by the proper application of heat, were removed

higher up in the tube, and condensed in the form of a white crystalline crust. *This when placed on burning charcoal, yielded the alliaceous odour.*

From these experiments the inference was clear that the fluid contained *arsenic*, and we so gave our testimony on the trial of the prisoner, who was convicted. A question arose during our examination before the jury, whether the arsenic sublimed in the tubes, might not have been derived from the glass of which they were made. As we had neither of us ever examined this subject experimentally, nor found any reference to it in the books, we spoke from a general view of the subject in replying in the negative. We have since had the high gratification of finding that the same question had arisen in France, and that a commission appointed to investigate it had reported through Mr. Pelletier, that the results of such experiments were liable to no fallacy from this source. The report at large is given in a late number of the Journal de Chimie Medicale.

The stomach was removed from the body several days after inhumation, and after having been examined by the medical gentlemen, was delivered to us for a chemical examination.

The process of separating the contents and boiling the stomach, was performed as directed by Dr. Mitchell, in the following manner :—

1st. The stomach, cut into small pieces, was boiled with the contents for about a quarter of an hour, in a pint of distilled water, and the liquor strained and filtered. The clear liquor was boiled down to half a pint, and again filtered—to this was added a fluid ounce of hydrochloric (muriatic) acid, the whole again boiled and filtered; and whilst still hot, a current of sulphuretted hydrogen gas was passed through the solution for an hour and a half. No appreciable precipitate was observed.

2d. A portion of the above solution was evaporated to dryness in a watch glass, manifesting during the evaporation the presence of organic matter. The dry mass mixed with boracic acid and charcoal, submitted to the reducing test, furnished a sublimed ring, which was entirely dissipated by

the second application of heat, without any evidence of the presence of arsenic.

3d. About an ounce and a half or two ounces of solution No. 1, was saturated to excess by liquor of potassa, and acetic acid added until litmus paper was tinged red. A current of sulphuretted hydrogen gas being then passed through, a precipitate began to form, which seen through the medium of this liquid has a brownish colour. The fluid containing the precipitate was then boiled and set aside. The precipitate having subsided, was removed and well washed with distilled water; dried on a watch glass; deflagrated with nitre, in a tube; lixiviated with distilled water; the ley poured off clear; when on the addition of lime water, a white precipitate fell, which, submitted to the process for reduction, gave no evidence of arsenic. The white precipitate was doubtless carbonate of lime.

4th. A portion of the solution No 1, was evaporated to dryness and mixed with a flux composed of boracic acid previously exsiccated, and charcoal; this exposed to the reduction process, gave a whitish crust approaching to yellow. The crust being sublimed higher up in the tube, and the tube separated by a file, the whole sublimed matter was expelled by heat, without yielding any evidence of arsenic.

5th. Half of the fluid, having been evaporated to dryness, was deflagrated with nitre in a crucible, the product lixiviated with distilled water, and the ley evaporated to dryness.

6th. A portion of the dry residuum No. 5, submitted to the process for reduction, gave no ring, nor any other indication of the presence of arsenic.

7th. The remainder of residuum No. 5, dissolved in distilled water and evincing alkaline reaction, was acidulated with acetic acid and then submitted to a current of sulphuretted hydrogen. The solution having been heated, and precipitate separated, washed and dried, exposed in a tube with charcoal for reduction, gave no indication of the presence of arsenic.

8th. The solid animal matter left from the treatment, (No.

B

1,) together with the filters and funnels, were digested in one ounce of nitro-muriatic acid, diffused through half a pint of distilled water, and the solution evaporated to dryness. The dry mass treated with nitro-muriatic acid, was again evaporated to dryness, and this dry mass treated with distilled water; to the solution lime water was added so long as any precipitate fell. The precipitate collected, well washed and dried, was submitted to the process for reduction, and no result obtained at all indicative of arsenic.
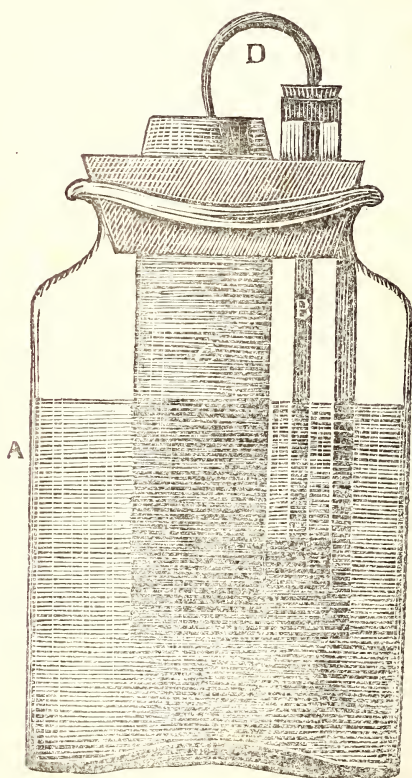
A, a wide mouth phial, the cork perforated so as to admit the suspension through it of a tube, *B*, and a piece of sheet zinc, *C*.

B, a tube of from one quarter to half an inch in diameter, the lower end covered with a bladder. The cork in the upper end perforated to admit the passage of a copper wire, *D.*

C, a piece of sheet zinc, its breadth about half the diameter, and its length two-thirds the height of the phial. This piece of zinc is suspended by a perforation in the cork. The phial is about two-thirds filled with a moderately strong solution of muriate of lime, and the liquid supposed to contain arsenic put into the tube. The exterior portions of the zinc and copper being put in conjunction, in about twenty-four hours the arsenic, if present, is precipitated on the copper wire immersed in the solution.

Baltimore, April 1, 1834.

ART. XXI.—ON IODINE AND ITS COMBINATIONS.
By AUGUSTIN DUHAMEL.
(Extract from Inaugural Thesis.)

AFTER briefly noticing the discovery of iodine by M. Courtois, and its properties, the author states the most approved modes of manufacturing it, and adds :—

The iodine of commerce is often sold in a moist state, which is a fraud done to increase the weight of the iodine. It is sometimes adulterated with oxide of manganese, charcoal and plumbago, but these from their insolubility in alcohol, and fixedness by heat, may be readily distinguished from it.

He then enters into a consideration of its chemical affinities, and the best methods of obtaining its different pharmaceutic preparations. As many of these have already been noticed in preceding volumes of our Journal, we shall confine our extracts from his thesis to such parts as have the recommendation of novelty or practical utility.

Iodides of Phosphorus.—Iodine combines with phosphorus in several proportions. All the combinations of iodine with

this elementary body, are accompanied by a disengagement
of heat; in contact with the air, the heat is so great as to
cause vivid combustion, when these two substances are put
together. In close vessels, an evolution of heat takes place,
but the mixture does not inflame.

One part of phosphorus and eight parts of iodine give rise
to a combination of an orange colour, which fuses at 212° F.,
and at a more elevated temperature sublimes without altera-
tion. Put in contact with water it disengages phosphuretted
hydrogen gas; a flocculent precipitate of phosphorus ensues,
and the water which is colourless contains hydriodic and
phosphorous acids.

One grain of phosphorus, combined with iodine in differ-
ent proportions, exceeding eight grains, gives either gray or
black compounds, which are fusible, also decomposed by
water, and more or less coloured, according to the quantity
of iodine. Phosphorous acid is always formed when the
phosphorus is in excess, and phosphoric acid when the iodine
is above sixteen parts, for one of phosphorus.

Dr. J. K. Mitchell of this city, some time since informed
me that in the preparation of hydriodic acid, after heating
the mixture of iodine and phosphorus, slightly moistened with
water, he found some singular crystals, collected in the beak
of the retort, which part being cut off, closed at the ends,
and submitted to the action of the solar rays, gave rise to the
formation of large cubic crystals. With water they occa-
sioned an effervescence, and hydriodic acid was formed. Since
which, I found the same substance made mention of in the
Journal de Pharmacie, April, 1832, in a paper by Mr. Serullas.

Mr. S. laid before the Societè de Pharmacie de Paris,
some specimens of hydriodate of phosphuretted hydrogen, in
large and beautiful crystals.

He stated that it was easily procured by distilling a mixture
of fifteen parts of phosphorus and sixty of iodine, triturated
with pounded glass and moistened with eight or nine parts of
water.

The crystals obtained after the condensation of the gase-
ous products were exposed to a gentle heat in a vessel of

proper size and sublimed. This substance crystallizes in diaphanous cubes, and is decomposed by water, forming hydriodic acid, and protophosphuretted hydrogen. It volatilizes, and may be passed through a heated tube without being decomposed; its vapour, however, is readily inflamed by contact with an ignited body.

Concentrated alcohol, with the aid of heat, transforms it into hydriodic ether, and phosphuretted hydrogen gas. Heated with nitrate of silver, it is transformed into iodine and phosphate of silver.

Having in my hand, one day, a bottle of tincture of iodine which I had occasion to use, and observing a bottle near me containing phosphated ether, I felt curious to know what phenomena would attend the simple mixture of these solutions together.

It may not be deemed superfluous to mention that this phosphated ether was of about the strength of six grains to the ounce. Upon adding some of it to a portion of the tincture of iodine, which I had poured into a glass vessel, I was much surprised to observe the liquid rendered instantaneously colourless. Being allowed to remain undisturbed for a few hours, minute shining white crystals, were deposited from this mixture. The crystals separated by filtration, were decomposed by contact with the air, becoming of a brown colour from the iodine, and emitting white fumes like phosphorus.

The mother liquid, possessed a somewhat peculiar odour, and a remarkably strong, acid taste, reddening litmus powerfully. Water put in contact with a portion of this liquid, decomposed it; the peculiar alliaceous odour of phosphorus was given off, the liquid lost its transparency, and upon its surface, there floated a filmy, white, fuming substance, which proved to be pure phosphorus. A portion of the acid mother liquor, neutralized by alkalies, formed a dirty yellow precipitate with nitrate of silver, and a bright yellow precipitate with acetate of lead. Another portion formed a blue colour with a boiling solution of starch.

My attention being withdrawn to other business, I discontinued my experiments, until lately, when in taking up the

subject again, in the endeavour to investigate the nature of this singular product, which I had supposed to be a combination of hydriodic and phosphoric acids, I failed in obtaining what had before resulted, on several different occasions.

Iodides of Mercury.—For the knowledge of the compounds which iodine forms with the mercury, the science is much indebted to M. Boullay, who after careful investigation, proved the existence of several distinct combinations, among which was the sesquiodide, heretofore erroneously supposed to be the protiodide of mercury.

These combinations, so often confounded, having been properly defined M. Boullay, have been recognized by Dumas and Berzelius. Late authorities in the English language, make mention of two combinations only—the yellow, improperly called the protiodide, and the red or deutiodide.

The attention of the medical public should be drawn to this change, in order that they may not, in prescribing the iodides of mercury, receive from the apothecary a preparation not intended.

I have been led to this remark, by the circumstance of my having of late received prescriptions directing protiodide of mercury, which sometimes required the use of the green, and at other times the yellow iodide. In such cases, I had, of course, to make myself acquainted with the wish of the physician.

Protiodide, or Green Iodide of Mercury.—This may be prepared by means of protochloride of mercury and iodide of potassium. Take an atom of each, mix them with boiling water, and let them digest until the mixture becomes cool, then decant. The iodide thus prepared is pure, when the liquid contains nothing but chloride of potassium. It is difficult, however, to avoid the formation of some yellow iodide.

Boullay recommends as the best process, the decomposition of the protacetate of mercury by iodide of potassium, allowing an excess of the acetate : wash the precipitate with boiling water, and dry it in the shade.

A very easy and simple process is that of Berthemot, which consists in triturating one atom of mercury, with one atom of iodine, taking care to add a few drops of alcohol. The alcohol evaporates, leaving the green iodide of mercury very pure.

It is insoluble in alcohol and water; slightly soluble in solutions of iodide of potassium, and protonitrate of mercury. Heated in a glass tube it sublimes, forming the red iodide and metallic mercury.

Sesquiodide, or Yellow Iodide of Mercury.—This is obtained by adding to an acid solution of the protonitrate of mercury, a solution of iodide of potassium. The excess of acid sets free some iodine, which in combining with the protiodide formed, transforms it into deutiodide, or sesquiodide, according to the proportions. Thus, when the salt is neutral, the precipitate is green; when it is a little acid, it is yellow; when a little more acid is present, it is red; and lastly, when it is in excess, free iodine and the red iodide appear together.

When upon these precipitates, an excess of hydriodate of potash is poured, the iodine is first dissolved, then the free red iodide, afterwards the red iodide contained in the sesquiodide which passes to green; lastly, the green iodide itself is decomposed into deutiodide and metallic mercury.

Mixtures of the red and yellow iodides may be separated by means of alcohol, which dissolves the first without taking up any of the second.

The most simple means, however, of preparing the yellow iodide, consists in forming a sesquiodide of potassium, and employing it to precipitate a solution of protonitrate of mercury, allowing this last salt to be in excess, and shaking the mixture.

The precipitate may be washed with alcohol to be sure of the result.

The yellow iodide, submitted to heat in contact with the air, becomes red, and again upon cooling, yellow.

Deutiodide, or Red Iodide of Mercury.—This compound according to Dumas, may be obtained directly by triturating mercury, with an excess of iodine, and treating the mass with alcohol in small quantities at a time, to wash away the uncombined iodine. It should be done promptly and with precaution, in order not to take up any of this compound, which is soluble in alcohol.

This, however, is not a good process, as the iodide prepared after this manner is of a dull brick red colour.

The best way of preparing it, is by double decomposition, by means of iodide of potassium and deuto-chloride of mercury.

To have the red iodide pure, exactly one atom of each must be employed, or the iodide of potassium must be in slight excess.

When iodide of potassium in solution is poured by small quantities into a solution of corrosive sublimate, a red precipitate is formed, which by agitating the mixture is redissolved. This is a soluble compound of chloride and iodide of mercury. Upon the addition of a little more of the iodide, a permanent pale red precipitate is obtained, which is also a compound of chloride and iodide of mercury, but richer in iodide, and insoluble. Upon the addition of a little more of the iodide of potassium, a brilliant red precipitate is produced. This, the pure deutiodide is of a very fine red colour.

It is fusible and volatile; its vapours condensing in spangles, or dust of a yellow colour, which after some time regains its red colour. The least scratch or friction is sufficient to restore it to its original colour. The red iodide is soluble in alcohol, and sparingly soluble in water; soluble in hydriodic acid and the soluble iodides; also soluble in hydrochloric acid and the soluble chlorides. From its boiling solutions, crystals are deposited upon cooling.

Deutiodide of mercury, according to Boullay, forms with the other iodides a series of double salts, which are crystallizable.

Iodo-hydrargirate of Potassium.—A physician of this city wishing to make a trial of this salt, commenced making it according to the direction given by Dumas, by first preparing the biniodo-hydrargirate of potassium.

A cold concentrated solution of iodide of potassium was treated with as much deutiodide of mercury as it would dissolve, and the liquid, which was of a deep yellow colour, evaporated by a mild heat.

The greenish yellow pulverulent substance which resulted, being dissolved in ether in a close vessel, then laid aside, and after an interval of several days submitted to spontaneous evaporation, gave a crystalline mass of a brown colour, throughout which were imbedded numerous transparent, shining, straw coloured crystals, having the form of hexahedral prisms. These dissolved in water precipitated half of its iodide of mercury. The filtered liquid upon evaporation, gave the iodo-hydrargirate of potassium, in the form of a crystalline yellow mass, and very soluble.

In a paper by Dr. Channing of New York, inserted in the American Journal of Medical Sciences, wherein he bears testimony to the efficacy of this new preparation in pulmonary disease, Dr. C. states, that for medical use, crystallization is unnecessary, inasmuch as a solution combining a fraction more than eight grains of the iodide of potassium with eleven grains of the iodide of mercury, may be used as containing twenty grains of the iodo-hydrargirate of potassium, the difference being, if any, too small to merit consideration.

Iodide of Copper.—This is very little known, and unimportant. In the course of my experiments upon the combinations of iodine, my attempt at forming iodide of copper was attended with the following result:—A vessel, in which a plate of metallic copper was exposed to the contact of water and iodine, was placed under a bell glass and laid aside. Upon examination about two months after, during which time it had remained undisturbed, some very minute, shining, dull white crystals were observed, floating upon the

liquid, which was of a dark brown colour, and exhaled a strong odour of iodine. The plate of copper was found coated with a hard crystalline crust of a dull white colour, easily separable from the plate, with a spatula.

Some iodine remained at the bottom of the liquid, having been prevented from further action upon the metal by the coating which protected it. This crust was most probably the subiodide of copper. Neither water nor alcohol dissolved it. It was dissolved by hydriodate of potash. Exposed to an intense heat, it became yellow and fused.

A solution of a salt of copper, and a solution of iodide of potassium mixed, forms a gray precipitate, which is a mixture of iodide of copper and iodine.

Iodine and Lead; Iodide of Lead.—This is easily made by double decomposition, by means of a solution of 100 parts of iodide of potassium, and one of 75 parts of acetate of lead. The two solutions being mixed, iodide of lead is precipitated in the form of a rich yellow powder. By drying, it loses a great deal of its lustre, and becomes further tarnished by exposure for some time to the air.

Iodide of lead is sparingly soluble in cold water, and still more so in alcohol. The water and alcohol do not become coloured. It dissolves in boiling water, and precipitates upon cooling, in brilliant micaceous scales, of a fine golden yellow colour. Alcohol boiled with iodide of lead, becomes quite red, but changes again upon cooling to its original colour. It fuses by heat. Caustic potash decomposes it.

An excess of iodide of lead, put in contact with a concentrated solution of iodide of potassium, forms a double iodide, which by evaporation is exhibited in the form of pale yellow scales. It is decomposed by water, which precipitates the iodide of lead. Treated with boiling alcohol, very minute, shining, acicular crystals are formed, of a pale yellow colour, unalterable in the air, and decomposed by heat, water and the strong acids.

Iodide of Zinc.—This is obtained by digesting zinc in ex-

cess, with water and iodine, and proceeding in the same manner as directed for the preparation of iodide of iron. Here the mixture when in the state of ioduretted hydriodate of zinc, is of a reddish orange colour. Upon being allowed to stand for ten or twelve hours, the combination is completed, and the clear solution is of a beautiful yellow colour, possessing a highly astringent taste. Exposed to the air for some time, the solution decomposes, iodine is liberated, and oxide of zinc precipitated.

The dry iodide, which is of a dark gray colour, and of a granular form, is very deliquescent, and sublimes in fine crystalline needles, when fused.

By digesting iodine in a concentrated solution of this salt, a biniodide of zinc is formed, the solution of which is of a deep brown colour.

Iodide of Iron.—The protiodide of iron is easily obtained, by submitting one part of iron to the contact of two parts of iodine, previously mixed with water, and proceeding as indicated by Mr. E. Durand, page 287 of the fourth volume of the Philadelphia Journal of Pharmacy.

The iodine is mixed with water in a porcelain capsule, and the filings of iron are added gradually, stirring at the same time the mixture with a glass rod. The combination takes place gradually, increasing the temperature of the water, about 50°. F.

When made with caution, no evolution of iodine takes place; but should the iodine and iron come in contact without the intervention of water, the iodine would in all probability be wholly volatilized.

The mixture acquires at first an orange colour, which gradually deepens to a dark red. At this point, the iodine is not perfectly saturated, and the liquid is then in a state of ioduretted hydriodate of iron, or a solution of ioduretted iodide of iron. By applying a moderate heat, the entire combination is soon effected, and the liquid becomes perfectly limpid.

The clearness of the liquid is the criterion by which the accomplishment of the operation is indicated.

The application of caloric, is not absolutely necessary; by abandoning the mixture to itself for a few hours, at a temperature of 60° F., as I have frequently experienced, the combination will also be effected. In that state, it is to be filtered and evaporated to dryness in a sand bath. This salt, which crystallizes with difficulty, is of a greenish black colour, passing to a metallic gray if the heat be too strong or protracted.

It has a very strong styptic taste, like chloride of iron; like that salt, it is deliquescent, and must be preserved in well stopped bottles.

The medicinal solution of iodide of iron, which was first introduced into medical practice in this city by Dr. S. Jackson, and which of late has been so extensively prescribed by our physicians is made in these proportions:

$$\text{Iodine,} \quad - \quad - \quad - \quad - \quad - \quad \text{ʒx.}$$
$$\text{Pure iron filings,} \quad - \quad - \quad \text{ʒv.}$$
$$\text{Water,} \quad - \quad - \quad - \quad - \quad \text{F. ʒxiiss.}$$

Use at first one half of the water, and keep the remainder to wash the capsule, and filter. This solution contains about one drachm of dry iodide of iron to the fluid ounce; it is prescribed in doses of from three to ten drops, three or four times a day. As this solution is not permanent, by reason of the feeble combination of iodine with iron, it soon acquires a reddish colour, owing to free iodine, and some oxide of iron is precipitated. This may be obviated by adding to the solution a small quantity of iron filings, which takes up again the iodine as it gets liberated from its former combination.

It will be observed, that the quantity of iron filings in the formula given above, is in great excess, but it is advisable to have it so in order to avoid the production of a periodide of iron.

Iodide of Potassium.—There are various ways of forming this salt. It may be prepared—1st. By the action of hydriodic acid upon potash, or carbonate of potash in solution. 2d. By the action of iodine upon a concentrated solution of potash. 3d. By the decomposition of iodide of iron or zinc in solution, by

means of carbonate of potash. And 4th. By the action of the sulphuret of potassa.

Among the different processes given to prepare it economically, the following is thought by Berzelius to be the best:— Dissolve iodine in caustic potassa in solution, until the liquid begins to be coloured. Evaporate this until the iodate of potassa crystallizes; boil the mother liquid to dryness, to obtain the iodide of potassium, and fuse the saline residue to destroy the iodate of potassa, which might be found with it. The iodate of potassa first obtained, may be converted into iodide of potassium, by hydrosulphuric acid.

The solution may also be evaporated and the mass fused, without commencing by separating the iodate from it; but as ebullition ensues, the mass may flow over the top of the vessel and cause a loss.

The formula given in the U. S. Pharmacopœia, is the one recommended by Dr. Turner of London, and directs the action of hydrosulphuric acid upon a solution of potassa, saturated with iodine &c. &c.

The following process, by Baup and Caillot, which gives a very white product, is said to be generally followed in France:—

A solution of protiodide of iron is heated nearly to the boiling point, and then saturated with carbonate of potassa, the alkali of which forms a hydriodate in solution, and precipitates the oxide of iron. This last must be separated by filtration, and the liquid evaporated to a pellicle in a porcelain capsule. Upon cooling, crystals of iodide of potassium are formed, which must be washed with a little water, and dried between folds of bibulous paper, aided by a slight heat.

This same salt may be obtained by substituting zinc for the iron.

In general, the crystals of iodide of potassium are opaque, of a milky whiteness, having an acrid taste, and contain water. In cooling a very concentrated solution, iodide of potassium, may be obtained, crystallized in the form of rectangular prisms, with four faces, which do not contain any water of crystallization.

Iodide of potassium exposed to the air, deliquesces. It is soluble in two-thirds of its weight of cold water, less soluble in alcohol, and much less so in absolute alcohol; hot alcohol, however, dissolves more than cold, and the solution upon cooling, deposites the iodide in needles. Iodide of potassium is partially decomposed by sulphuric ether. In digesting iodide of potassium in this menstruum, it becomes highly coloured with a portion of iodine, which separates from the salt; the iodine attaches itself to the sides of the vessel, at the surface of the liquid; what remains after pouring off this liquid, appears to be a subiodide of potassium. Iodide of potassium fused, has a crystalline and pearly appearance, and volatilizes at a high temperature.

Iodide of potassium is frequently adulterated with other salts, and especially with chloride of potassium. As this substance has become one of the paramount articles of the materia medica, it is essential to find out a means of procuring an article of great purity. Dr. Turner has proposed two methods tending to this result. The first consists in dissolving one part, by weight, of iodide of potassium in 12,000 parts of water, and dropping into the solution some chloride of platinum. If the iodide be pure, the solution is coloured red. The second, in dissolving one part of iodide of potassium in 40,000 parts of water. The exhibition of a few drops of a solution of protonitrate of mercury, precipitates with the pure iodide a greenish powder, which is taken up by the addition of 20,000 parts more of water.

Mr. Maroseau in an article published in the June number of the Journal de Pharmacie for 1832, in allusion to the above methods, says the first does not always succeed, and that the other, although preferable to the former, is yet very imperfect, as to the possibility of ascertaining the degree of adulteration, and proposes the following one as more simple, and better adapted to the latter object. This is founded on the reaction of the bichloride of mercury upon iodide of potassium. It is well known, that when a solution of the former is mixed slowly with a solution of the latter salt, the first precipitate thrown down is almost immediately taken up again

—but by a further addition of the bichloride of mercury, you arrive at a point when an abundant and persistent precipitate of biniodide of mercury is formed.   By operating with solutions of a known strength, and observing the proportions in which these salts react, it will be found—1st. That no precipitate is obtained by mixing four atoms of iodide of potassium with one atom of bichloride of mercury, and that the products of the reaction are two atoms of chloride of potassium and one of a soluble salt, formed of one atom of biniodide of mercury and two atoms of iodide of potassium.   2d. That the addition of a new atom of mercury (bichloride) precipitates all the iodine, producing four atoms of chloride of potassium and two atoms of an insoluble biniodide of mercury.   The addition of almost any quantity of chloride of sodium produces hardly any change in the result.

Hence nothing can be more simple, to ascertain the proportion of muriate of soda that has been mixed with iodide of potassium, with a view to adulterate it, than by dissolving separately, in the same quantity of water, four atoms of iodide of potasium and one of bichloride of mercury, (say 100 grains of the former and 42 of the latter.)   Take a tube graduated to 100° and pour into it 50 parts of the solution of the iodide; add the solution of the bichloride of mercury as long as the precipitate formed by the action of the two solutions upon each other will dissolve by agitation, and suspend the process when the mixture begins to acquire a reddish tint.   If the quantity of solution of the bichloride is exactly the same as that of the iodide, you may infer that the latter is pure ; if, on the contrary, only one-half of the solution of bichloride has been employed, then the iodide is adulterated with one-half of foreign matter.

Biniodide of Potassium, according to Baup, is obtained by dissolving iodide of potassium in water, and adding iodide in excess to the liquid till it will dissolve no more.   Biniodide of potassium is a liquid of a deep brown colour; it is unknown under a solid form.

The *Tritiodide* is obtained by dissolving iodide of potas-

sium in an equal weight of water, and macerating it with more iodine than it can dissolve. The solution, which is black, or bluish black, appears of a deep red upon looking through it, but when viewed by reflected light, it is endowed with a lustre almost metallic. The liquid can be mixed with a quantity of water equal to one and a half times the weight of the iodide, without being decomposed, but if more be added, iodine is precipitated in crystalline scales, whilst biniodide remains in solution.

These liquids are employed in medicine under the name of *ioduretted hydriodate of potash.*

Iodine may be given in the form of—Vapour, which is respired by means of a tubulated bottle, containing diluted sulphuric acid, into which is thrown, daily, from a fourth to half a grain of hydriodate of potash, in the case of tuberculous phthisis.

In the form of—Pills, it has been administered in doses of fractions of a grain, associated with an extract, but owing to its highly irritating effect upon the stomach, in a solid state, as observed by M. Lugol in his extensive use of this substance, the form of solution has been substituted.

Lugol's ioduretted mineral waters are commonly preferred. The dose of this aqueous solution is one ounce and a half. The concentrated solution is given in the dose of six drops, twice a day, in sweetened water.

Iodine may be given in the form of syrup, made in the proportion of half a drachm of tincture of iodine, to one ounce of simple syrup. Dose one to two drachms.

The æthereal tincture of iodine, is very little used. Dose ten drops.

The alcoholic tincture, on the contrary, is in general use, though of unequal strength, being directed according to some recipes, in the proportion of two scruples to the ounce of rectified alcohol; other recipes direct more or less. The proportion directed in the French formula, corresponds to twenty-four of the English, and is less active than ours. Accidents are therefore likely to arise from the uncertainty of the

strength of the tincture employed. Dose ten to fifteen minims, but may be increased to sixty minims, three times a day.

As a medicament, the alcoholic solution is a bad form of administration, as the iodine is precipitated by water upon the surface of the stomach. The contact of the tongue alone is sufficient to decompose it. The greater part of the medicaments with which it is desired to associate it, change its nature ; moreover, its disagreeable, highly acrid taste, compared to that of the hydriodates should warrant the substitution of these last. For medicinal purposes, the solution of iodide of potassium is given in the dose of from ten to thirty minims three times a day.

The hydriodate of soda has been employed by Coindet in the same circumstances as the hydriodate of potash, and appears to enjoy the same medicinal properties.

The dose of the metallic iodides should not exceed a sixth or a fourth of a grain, which may be given in the form of pill, as the iodides of lead and mercury. Iodide of gold has been administered internally in the dose of a twelfth of a grain, in venereal affections.

Those of the iodides that are deliquescent are best prescribed in solution, as the hydriodate of iron, which is given in the dose of from three to ten drops, in sweetened water, three or four times a day. Externally, iodine is employed, under the form of ointment, in frictions of from a scruple to half a drachm.

The iodide of sulphur ointment has been employed with excellent success by Biett, in cutaneous affections.

The iodine baths, so much esteemed by Lugol, may be used three or four times a week. In preparing the iodine baths, the iodine and potassii iodidum should be mixed together in a small quantity of water, and allowed to dissolve perfectly before adding the rest of the water. A wooden bath tub should be used. Iodide of potassium has very little effect, according to Lugol, in baths, at the dose of half an ounce.

In prescribing the medicinal preparations of iodine, physicians generally are not accustomed to adhere to any fixed

formula, but vary in the proportion and dose, sometimes strong, at other times weak, as the case requires.

The tincture is the only officinal preparation of iodine in the U. S. Pharmacopœia.

This, the first preparation of iodine, tried by Dr. Coindet, is said by Messrs. Le Royer and Dumas, to decompose, forming successively hydriodic acid and hydriodic ether, and to deposit iodine. This change I have never observed. A well closed bottle containing tincture of iodine I have kept a number of months, without perceiving any alteration.

<div align="center">

Lugol's Diluted, or Jackson's Iodine Solution.

Iodine	Əj.
Iodide of Potassium	Əij.
Water	F.℥vij.

</div>

<div align="right">M.</div>

A typographical error having occurred in the original French work publishing the formula of Lugol's concentrated solution of iodine, by the substitution of the sign *ounce* for *drachm*, this mistake has been copied from book to book, without correction, causing many physicians to be deceived in the use of it.

Dr. Samuel Jackson of this city, having through this source prescribed it in a diluted form, and finding beneficial effects to result from the use of it, has preserved this formula, distinguishing it, however, from the other, by the term of Lugol's diluted, or Jackson's iodine solution.

This error, noticed by Dr. Bache, is made obvious to the reader of the original pamphlet, by the subsequent mention, after the given formula, of its containing one twenty-fourth of iodine, which is the case with the true formula.

Thus, the seven drachms of water, or twenty-one scruples, and the two scruples of iodide of potassium, with the one scruple of iodine, make in all twenty-four scruples. Here the iodine is in the proportion of one twenty-fourth.

Ointment.—The ointment of iodine, and such of the iodic preparations as may be employed in the form of ointment,

are most conveniently and nicely prepared upon a marble slab, with the assistance of a glass muller and steel spatula. This last may be considered, by some, objectionable, on account of the action upon the metal. This, by some dexterity, may be avoided, in the use of a steel spatula, which is preferable to one of glass or bone, from the inconvenience attending the use of these last, by reason of their inflexibility.

The preparation of the ointment of iodide of potassium may be facilitated by rubbing the salt with a few drops of water, previous to adding the lard or simple ointment, which last is most commonly used. In this manner the ointment, may be made very smooth.

When fresh, it is white, but contracts a yellowish tinge after several days, and eventually becomes yellowish brown, from the formation of an ioduretted hydriodate. This change, as remarked by Mr. Powers, graduate of pharmacy of Philadelphia, does not occur so soon with lard as with simple ointment.

In forming the iodine ointment, which should be smooth without any grit, the iodine may be finely divided, by first rubbing it with the muller, assisted by a few drops of alcohol or ether; then by adding the lard or simple ointment by portions. This forms a fine ointment of a pale rose colour.

In making the ioduretted hydriodate of potash ointment, advantage may be taken of the ready solubility of iodine in a solution of iodide of potassium; upon adding a few drops of water to the mixture, and rubbing it with the muller, the division is so effected that it may be conveniently mixed with the lard. This forms an ointment of a reddish brown colour, but becoming quite black when kept for some time.

Iodide of Sulphur Ointment.—Iodide of sulphur, from ℥ss. to ℥i.—lard or simple ointment, ℥i. M.

This feeble combination can have no better property than an extemporaneous mixture of iodine, sulphur and cerate. For in preparing an ointment of this compound, in which I employed some simple cerate made with rose water, I found

it was decomposed by it, giving out a strong and exceedingly pungent, peculiar odour. Probably a hydrosulphuret of iodine was formed.

ART. XXII.—MEDICO BOTANICAL NOTICES.—No. 3.

Jalap.—In the second volume of the *Journ. Phil. Col. of Pharm.* (page 22 et seq.) Mr. D. B. Smith gave an account of the plant producing the officinal jalap, in which he availed himself of the memoir of Dr. J. R. Coxe on the same subject, originally published in the *Amer. Journ. Med. Sciences* for February, 1830. In vol. 4, p. 339, we also translated some remarks by Mr. Guibourt on the paper of Mr. Smith; since this Mr. Pelletan has given a memoir in the *Journ de Chim. Med.* for January, 1834, which corroborates the opinion of Dr. Coxe, that the plant described and figured by him is really that from which the jalap of commerce is derived. As every thing relating to the history of this important drug must necessarily be possessed of interest to the medical botanist, we shall condense Mr. Pelletan's remarks, and add a few observations which suggested themselves on the perusal of this memoir.

The first author who speaks of jalap in a definite manner, is Caspar Bauhin, in 1609, (*Pinax.* 298. *Prod. Theat. bot.* 135.) under the name of *Bryonia mechoacana nigricans.* But succeeding botanists appear to have been in a state of great uncertainty as to the plant furnishing this root. Ray (*Hist. Plant.* 724,) refers it to the genus convolvulus under the name of C. *Americanus jalapium dictus;* in this he was followed by Pluckenett, (*Phytog. Tab.* f. 1.)

Some time afterwards, Tournefort, misled by Plumier and Lignon who stated that they had seen the plant in America, attributed the jalap to a species of *Mirabilis,* (*Inst. Rei. Herb.* 130,) and this erroneous idea was also adopted by Lemery in the second edition of his great work on drugs, where he figures a mirabilis as the true jalap plant.

Notwithstanding the weight of an opinion from such a source, Miller (*Gard. Dict.*) and Sloane (*Hist. Jamaica,*) again referred the jalap to convolvulus, and their statement was confirmed by Houston, who brought the plant from South America and showed it to Jussieu, who decided that it belonged to that genus.

Linnæus, however, in the first edition of his Materia Medica still adhered to the opinion of Tournefort, and attributes it to the *Mirabilis longiflora.* Some years afterwards he recognized his error and placed it in the genus convolvulus, with the following specific characters:

C. *jalapa, foliis difformibus cordatis, angulatis, oblongis, lanceolatisque, pedunculis unifloris, seminibus lanigeris.*

But the subject still remained in uncertainty. Murray, (App. Med. i. 216,) on the authority of Thiery de Menonville, started the idea that there might be more than one species of convolvulus, furnishing the officinal jalap. The latter writer stated that he found a species near Vera Cruz, which he affirmed to be the true jalap, and the roots of which weighed twenty-five pounds. He drew up a description of this plant which he transmitted to Jussieu and Desfontaines, this latter botanist, on comparing the description of De Menonville with that of the *Ipomœa macrorhiza* of Michaux, specimens of which were growing in the Garden of Plants at Paris, was convinced that they were identical; hence when Michaux discovered the latter in Florida and sent the seeds to Paris, Desfontaines published a memoir on jalap, (*Ann. du Mus.* ii. 220,) in which he ascribed this drug to the I. *microrhiza*, and gave the C. *jalapa* of all preceding botanists as synonymous. The accuracy of this was first doubted by Mr. Nuttall, (*Gen. N. Am. Pl.* i. 123,) on the authority of Dr. Baldwin, who from actual experiment found that the I. *macrorhiza* was inert, and better fitted for an esculent than for a medicine.

In 1827, Dr. Coxe having received roots of the true jalap from South America, became convinced that the descriptions of former authors were erroneous, and in 1830 published a full account of it in the American Journal of Medical Sciences.

In 1829 also, Mr. Ledanois sent a short description of the same plant to Mr. Chevallier at Paris, thus confirming the discovery of Dr. Coxe.

The description given by Mr. Ledanois differs in a few unimportant particulars from that by Dr. Coxe, but it is evident that they both were drawn up from the same species.

Thus Mr. Ledanois states that the leaves are smooth without prominent views, whereas in the plant of Dr. Coxe, the nervures on the under side of the leaf are strongly marked &c. &c.

Mr. Pelletan proposes to call this species *Convolvulus officinalis*, and we are of opinion that his suggestion is a good one on many accounts.

The name C. *jalapa*, it is evident, leads to much confusion and uncertainty from its having been applied to many totally distinct plants. Thus the C. *jalapa* of Linnæus, the description of which approaches nearest to the present plant, may or may not be identical with it, but as it has been quoted as a synonyme for other and confessedly different species, it would be better to consider it as not yet identified by more modern botanists.

The C. *jalapa* of Woodville, judging from his representation of it, differs in many essential particulars, and as is justly observed by Mr. Nuttall, resembles one of the varieties of C. *panduratus*. Neither is it the C. *jalapa, Bot. Mag. Hort. Kew.* i. 211. *Willd.* i. 860, &c., as these evidently refer to the I. *macrorhiza* of Michaux, figured as above mentioned by Desfontaines in the *Ann. du Mus.*

As to the point in dispute, whether the plant in question is an *Ipomœa* or a *Convolvulus*, it is a matter of little importance. Botanists are by no means in unison as to what are the distinctive characters of each, and many have rejected the former entirely, or considered it as merely entitled to the rank of a subgenus.

Tournefort founds his differential character on the form of the corolla, whilst Linnæus considers this as of a secondary importance, and assumes the form of the stigma as the distinguishing mark, in which he is followed by Jussieu and

others. If this be adopted as a guide, instead of dividing Convolvulus into two genera only, we must erect a new genus for every different form of this part, and thus split up an otherwise natural group into a dozen or more sections. If a division be adopted, that proposed by Kunth of *Staminibus exsertis, inæqualibus,* and *Staminibus inclusis,* is the best, as it brings together those species which are most closely allied in other particulars; but even this plan offers many difficulties and anomalies.

Before concluding this notice, it should be mentioned that Mr. Nuttall stated to us, that he he still entertained doubts whether the plant described by Dr. Coxe was the true jalap, as he had found the tubers grown at Cambridge, Mass., were devoid of active properties. As this is not the case with those produced in this city, the objection is scarcely valid, but at the same time, the fact is highly interesting in itself, as showing the effect of climate or cultivation in modifying the properties of vegetables.   G.

ART. XXIII.—ON SYRUP OF ASPARAGUS &c.

By A. LATOUR (*de Trie*) and ROZIERS.

THE syrup of asparagus has justly obtained a high stand-
ing, from the marked sedative properties it possesses. But
its tendency to fermentation prevents its being kept for any
time without its undergoing a great alteration, which deve-
lopes an unpleasant putrid odour, and deprives it of all its
medicinal properties. To obviate this, the Journal of Medi-
cal Chemistry of 1830, proposes to dry the shoots, and to
make the syrup as it is wanted, from an infusion of the dry
plant.

This plan does not attain the desired result, as it is ex-
tremely difficult to dry these shoots, on account of their suc-
culent nature, and also because the aromatic principle is
destroyed by this process; we have endeavoured to discover
some mode, which whilst it would enable us to prepare the
syrup at any time, would also preserve the full qualities of
the fresh plant. The following has appeared to us to com-
pletely fulfil these indications :—

Preparations. 1. The asparagus shoots are to be reduced
to a pulp, and the juice separated by means of a strong press.
The quantity of juice furnished by the early shoots, is gene-
rally equal to two thirds of their weight; later shoots only
afford about half their weight.

The juice after having stood to settle, is decanted and
weighed, then heated in a water bath to coagulate the alu-
mine, afterwards filtered and evaporated to the consistence
of honey ; when a quantity of sugar equal in weight to the
juice before concentration, is to be added. This aqueous
saccharole is to be dried in a stove.

2. To the marc or parenchyma is to be added two-thirds

of its weight of alcohol at 30°, and the whole suffered to macerate for three days in a close vessel, then subjected to pressure through a linen cloth, and the same quantity of alcohol again added to the marc, and the mixture suffered to macerate till the next day, when it is to be boiled for five minutes, subjected to pressure as before, and the products of the two operations united together.

This mixture is to be distilled till three-fourths of the alcohol employed has passed over; when it has cooled, the same quantity of sugar as above is to be added, and the *alcoholic saccharole* which results is to be dried.

These preparations are to be kept in well stopped bottles, and from them a syrup may be extemporaneously prepared at all seasons in the following manner. Equal portions of each are to be taken and dissolved at a moderate heat in half their weight of water. When the syrup has been heated to ebullition, it is to be withdrawn from the fire and strained.

This syrup unites all the conditions required in good syrup of asparagus, and retains in the fullest manner the aromatic taste of the vegetable. The sedative properties of this syrup are much augmented in this preparation, as has been amply tested in practice. But in which of the principles peculiar to this plant does the sedative power reside? Numerous researches on this subject have been made by Mr. Johnson, who attributes it to a resinous body, from which he states that he makes his syrup.

Anxious to verify this fact, and to possess a readily prepared syrup of asparagus, we made the following experiment, Mr. Johnson not having published his method of manipulation :—

Thinking that the resinous substance would be found in the parenchyma of the asparagus after expression, as no trace of it was discoverable in the juice, we treated a certain quantity of this substance previously dried, with double its weight of alcohol at 31°. At the end of three days, the alcohol acquired a beautiful green colour. When boiled it deposited a great quantity of a green substance, part of which adhered to the sides of the vessel, and another floated on the

E

surface in the form of globules. We separated this substance by decantation, and discovered with astonishment that this pretended resinous principle presented all the characters of a fixed oil.

This oil is of a beautiful dark green colour, which, however, is very fugitive; for an alcoholic solution of it, exposed to the rays of the sun, soon lost its peculiar tint, and the oil which remained after the evaporation of the menstruum, was only of a yellowish hue. It has a peculiar and powerful aromatic odour, but a mawkish taste. It is somewhat viscous; at the temperature of 53° F., its consistence is that of a soft grease or of thick oil, which does not liquify till 75°. Placed in a tube, and cautiously exposed to the flame of a spirit lamp, it first assumes a reddish colour, and is then decomposed, affording the usual products of the oils, and leaving a tolerably voluminous charcoal.

Water has no action on it—ether and the oils dissolve it in all proportions. Alcohol at 31° readily takes it up. Nitric acid dissolves it without apparent decomposition, as does also hydrochloric acid, which appears to heighten the colour. Sulphuric acid dissolves it, acquiring a slight red tinge. By the action of a regulated heat, the colour becomes blood red, and the solution is thickened. Water precipitates it in a grayish form.

The alkalies dissolve it rapidly, and the acids precipitate it from this combination in white flocculæ. All these characters demonstrate to us the existence of a fatty oil extracted by the alcohol. This appears to us to be possessed of important medical properties.

It is certain that the syrup of asparagus, prepared either with the alcoholic, or with the aqueous *saccharole,* has a remarkably sedative property, in retarding the circulation and in acting specially on the heart.

From what has been said, it results that the union of the two preparations enables us to obtain the whole of the sedative principles of this substance. Moreover, pastilles may be made which may render the administration of this reme-

dy more easy.   We propose the following formula for
them :—

<div style="margin-left:2em">

Saccharole of asparagus, -   -   -   -   2 parts

Sugar in fine powder,   -   -   -   -   -   1   do.

Mucilage of gum Arabic, }
Orange flower water,   }   -   -   -   Q. S.

</div>

Make pastilles of twenty grains.

These pastilles should be kept in a well stopped bottle in a
dry place, as they are apt to attract moisture.

A jelly may also be made with this saccharole by adding
a solution of icthyocolla to it. This forms an agreeable com-
pound which might be advantageously used as an article of
diet.   *Journ. de Pharm.*

ART. XXIV.—ON VISCINE, A NEW VEGETABLE PRINCIPLE.
By Mr. MACAIRE.

IN the ATRACTYLIS *gummifera*, a plant belonging to the
COMPOSITÆ, which grows in Sicily, a peculiar exudation takes
place from the receptacle or involucrum ; this substance col-
lects in rounded, semi-transparent masses, which have a sort
of softness and semi-elasticity, like what is called mineral
caoutchouc, have no taste, and are of a slightly reddish co-
lour.

This substance, which Mr. Macaire admits as a new im-
mediate principle of vegetables, he terms viscine, from its
great viscidity.

It is lighter than water, floating on that fluid, but sinking
in alcohol at 36° ; it softens by heat, and on an increase of
temperature melts, swells and becomes brown, and on cool-
ing remains fluid, and will adhere to any substance with
great tenacity.   When considerable heat is applied, it burns
with a white flame, and much smoke, exhaling an odour like
that of burning oil.   In other respects it acts like other non-
azoted bodies, and does not afford ammonia on being treated
with lime.

Viscine is not soluble in either hot or cold water. But, at a temperature of 50° to 60° F., it absorbs a little of the fluid and becomes opaque; at 212° F. it remains translucent, and becomes very viscid and tenacious.

Alcohol at 40° does not dissolve it except by the assistance of heat, and deposits it again on cooling; boiling ether completely dissolves it, a very small portion being precipitated on cooling; when the ether is evaporated, the residue is extremely viscid.

Spirits of turpentine dissolves it by the aid of heat, and becomes very viscid; on evaporation it leaves a yellow, transparent, very glutinous substance, which is liquid when heated, but thickens on cooling, forming a tenacious transparent varnish. Boiling alcohol dissolves all the turpentine existing in this compound, and the glutinous matter is left with all its original properties. When exposed to the air it remains unaltered.

It is insoluble in either hot or cold fixed oils. It is dissolved by caustic potash which it slightly colours. Sulphuric acid dissolves it, and becomes of a dark brown colour; no artificial tannin is formed, but a large quantity of carbon is deposited. Nitric acid heated with it becomes of a reddish yellow colour and dissolves it. On evaporation to dryness, a substance of a yellow white colour remains, which is not bitter, does not contain oxalic acid, is soluble in caustic potash, to which it imparts a dark red colour, is very inflammable, burning like starch. It is composed of:

$$
\begin{array}{ll}
\text{Carbon,} & 75.6 \\
\text{Hydrogen,} & 9.2 \\
\text{Oxygen,} & 15.2
\end{array}
$$

This substance it is evident, approaches in its composition to the resins and wax, but differs from them in its viscidity, and its insolubility in alcohol and the fixed oils.

Mr. Macaire has investigated whether bird lime and the fruit of the white miseltoe contained viscine, and concludes from his experiments that the latter only contains gum and mucilage—that the bird-lime of commerce is composed of mucilage, acetic acid in small quantity, chlorophyl-

line, some foreign bodies, as sand &c. and a large proportion of viscine, which is perfectly identical to that which exudes from the Atractylis *gummifera.* Mr. Macaire also satisfied himself that the bark of the holly (Ilex *aquifolium*) boiled with water and buried in the earth, as in the preparation of bird lime, contained at the end of three weeks a marked proportion of viscine, which increased as the fermentation became greater. The bark of the miseltoe (Viscum *album,*) treated in the same way, afforded similar results ; finally, Mr. Macaire has discovered that viscine exists, though in small quantities, in the bark of these vegetables before fermentation, and that the latter process appears to transform all the mucilage and a part of the ligneous fibre into this singular substance. The chlorophylline is the only part of the bark which preserves its properties and remains unchanged.

Journ. de Pharm.

ART. XXV.—ON THE ACTION OF COLD CONCENTRATED SUL-
PHURIC ACID ON COPPER. By M. Barruel. Jr.

In all chemical works, it is asserted that cold concentrated sulphuric acid has no action on copper, and that no reaction takes place between these two bodies except at an elevated temperature.

The following experiments prove that pure concentrated sulphuric acid, whether hot or cold, acts on copper, but much more slowly in the latter case than in the former ; though with this exception, the mode of action is absolutely identical.

On the 12th of April 1833, I introduced into a ground stoppered bottle containing pure sulphuric acid of 66°, a portion of clean copper filings. At the end of ten days, the fluid had a light rose tint, at the end of three weeks this had disappeared, and the copper had preserved its metallic brilliancy. On the 12th of May, having opened the bottle, no odour of sulphurous acid was perceptible.

About a month afterwards, I perceived a small quantity of a brownish pulverulent substance lining the sides and bottom of the bottle. There was no disengagement of sulphurous acid. The quantity of brown matter augmented during the third, fourth, and fifth months, and small colourless transparent crystals were seen on the sides of the bottle.

At the end of the sixth month, the liquid exhaled a strong smell of sulphurous acid; I now examined the fluid, the crystals and the brown powder.

The liquid which was scarcely coloured, assumed a rich blue tint when water was added to it, and contained anhydrous sulphate of copper. The transparent and colourless crystals dissolved in water to which they imparted a blue colour, when exposed to the air they also become blue; these crystals were therefore anhydrous sulphate of copper.

Thinking that the brownish substance was sulphuret of copper, I poured it on a filter, and washed and dried it in a close vessel. The product, when treated with diluted nitric acid over a moderate fire, afforded a blue liquid (nitrate of copper,) and a grayish white residue in the form of flocculæ, which separated by filtration; after having dried it, a portion was placed on hot coals, when it melted and burnt with a blue flame and disengagement of sulphurous acid; another portion introduced into a test tube was volatilized on the application of heat.

It is evident from these experiments, that at the ordinary temperature, sulphuric acid is partly decomposed by copper into sulphurous acid and oxygen, which latter unites with a portion of the copper and forms an oxide, which is taken up by the acid forming an anhydrous sulphate.

The sulphurous acid is dissolved in the fluid, but the copper in turn reacts on it, and decomposes it into sulphur and oxygen, forming another portion of oxide of copper, and of sulphuret of this metal.

To assure myself of this, I introduced copper filings into a ground stoppered bottle filled with recently prepared sulphurous acid, free from any sulphuric acid. At the end of five or six months, the copper was transformed into a brown

matter, which on examination, proved to be sulphuret of copper, the fluid had acquired a blue colour, and had scarcely any smell of sulphurous acid. These facts led me to inquire if the reaction which takes place between copper and sulphuric acid by the aid of heat would afford the same results. I recollected, that on preparing at the School of Medicine anhydrous sulphurous acid by means of copper and sulphuric acid, the residue was brownish; I therefore wished to ascertain whether there was any formation of a sulphuret of copper.

I boiled concentrated sulphuric acid with copper filings, treated the residue with water to dissolve and remove the sulphate of copper; a brownish matter remained mixed with metallic copper which was readily separated from it. This brown matter, treated with nitric acid as in the former experiment, afforded sulphur.

From these experiments, I am of opinion that the action of acids on metals without the assistance of heat, has not been sufficiently studied, and that the experiments of M. Becquerel should lead us to the conclusion, that this action which is wholly electrical, must vary with the temperature, the duration of the process, the division of the metal and the concentration of the acid. *Journ. de Pharm.*

ART. XXVI. NEW ALCALOID SUBSTANCE DISCOVERED IN YELLOW BARK. By M. M. Henry and A. Delondre.

This substance in the state of a hydrate, is white and crystallizable in prismatic needles. It does not melt at a heat much higher than that required to fuse quinine. Its bitterness is very great, especially when dissolved in alcohol or an acid, but has not as much taste of cinchona as is possessed by quinine; alcohol holds it in solution even at 18° or 15° B., and by spontaneous evaporation this excipient deposits it either in crystals or at first in a sort of resin, which when moistened with diluted alcohol, gradually changes into beautiful crystals. Cold sulphuric ether also dissolves it in small

quantities. These crystals, when dried, effloresce when exposed to the air; they *rapidly* change syrup of violets to a green colour, and restore the colour of litmus paper reddened by an acid.

They combine with sulphuric, hydrochloric, nitric and acetic acids, forming pearl white salts, as perfectly crystallized as those of quinine, and precipitated white by ammonia, soda &c., from their aqueous solutions. When quinidine is strongly heated, it decomposes, giving out an odour which at first is aromatic, and afterwards empyreumatic, a part of the alcaloid also subliming. The capacity of saturation of quinidine appears to surpass that of quinine or cinchonine.

We have not yet determined its elementary analysis, except that it appears to abound in azote. This alcaloid which differs much from cinchonine in its form, its slight volatility, its solubility in very diluted alcohol, and its saline combinations, resembles quinine in some particulars, but nevertheless, is distinct from it, by the great tendency of some of its salts to crystallization, by its less degree of fusibility, its less solubility in sulphuric ether, and the property it possesses of changing from the resinous state to a crystalline one on being moistened with very diluted alcohol. These few experiments, which are only preliminary to a more extended study of it, have led us to consider this substance as new, and to bestow on it the name of *Quinidine.* We have isolated it from the yellowish fluid which contains quinine and cinchonine, after the distillation of the alcoholic tinctures in the preparation of quinine.

The new vegetable alcali appears to be accompanied by a yellow substance which we examined and believe to be an acid. Quinidine separated from this acid, requires several treatments which we will hereafter detail, to obtain it in a state of purity, for its union with the yellow substance appears to change its properties in a remarkable degree, and renders its salts very difficult to crystallize. We also think that it will be met with in the uncrystallizable mother waters occurring in the preparation of sulphate of quinine, and also

to exist in the quinidine of M. Sertuerner, a complex and impure compound, of whose existence we erroneously perhaps, had strong doubts.

Journ. de Pharm.

ART. XXVII.—ON CREOSOTE AND ITS PREPARATION.

By M. DE REICHENBACH.

[In our last number we noticed the discovery of this substance, and its properties, since which we have met with the following account of the manner of preparing it. Should it on further trial be found to possess the valuable antiseptic and hæmostatic powers ascribed to it, the demand for it cannot fail to be extensive.]

In impure pyrolignous acid at a temperature of 158° to 175°, F. as much sulphate of soda is to be dissolved as the acid will take up. After a certain time, the oil which has thus been isolated, is to be removed and permitted to stand for a few days, to permit the separation of any pyrolignous acid or sulphate of soda which may be combined with it; it is to be distilled with water, when a pale yellow oil is separated, which is to be mixed with diluted phosphoric acid and several times well shaken; the fluid is to be permitted to rest, till there is no longer any acid reaction, and finally it is to be mixed with a fresh quantity of the solution of phosphoric acid and distilled, pouring back the product several times. A colourless oil is thus obtained, which is to be dissolved in a solution of caustic potash marking 1,12. The supernatant *eupion* is to be removed, and the liquid to be left exposed to the air in a large vessel; the oil becomes brown from the oxigenation of some foreign substance mixed with it, this is to be saturated with sulphuric acid, and the oil separated and again distilled. The solution in caustic potash and the subsequent operations are to be repeated, as long as the oil becomes brown on exposure to the air. It is then to be distilled in a retort with a concentrated solution of caustic potash, and the

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distillation continued as long as the product is clear; this is to be again rectified in a small retort, rejecting the first portions that come over.

In all the distillations great care must be taken to avoid any condensation of drops on the sides of the retort, as they would be decomposed.

Creosote is extracted from tar, by distilling this till it becomes of the consistence of shoemakers' wax. The distilled fluid generally divides into two portions, separated from each other by a stratum of water; the lower portion only is to be taken. If this separation does not take place, the distillation is to be continued till the oil which passes over sinks to the bottom, when the recipient is to be changed and the distillation persisted in, till white fumes of paraffine make their appearance. The distilled fluid is to be saturated with carbonate of potash, suffered to rest, and the oil which collects at the surface separated. This oil is to be again distilled, and the last portions only of the product kept.

This is to be treated with diluted sulphuric acid, &c. &c. as in the process with pyrolignous acid.

These two products are identical. In the treatment of pyrolignous acid, the paraffine and eupion are most readily got rid of, but there is great difficulty experienced in removing the empyreumatic colouring matters. Tar affords a much larger proportion of creosote, and the operation is more rapid, but it requires great caution.

Journ. de Pharm.

ART. XXVIII.—ON PREPARATIONS OF ACONITE.
By M. Soubeiran.

The aconite (Aconitum *napellus*) is one of those energetic plants which ought to be a valuable auxiliary in the cure of disease; and yet, but little utility has resulted from its employment. The cause of this evidently is not owing to the plant itself, but to the erroneous choice of forms in which it

has been exhibited. In fact, it would appear that physicians have never inquired to what principle its medical action was attributable, and what influence pharmaceutic manipulations exercised on it. The form of extract recommended by Storck, is almost the only one in use, and yet it is indubitably the worst.

Although the nature of the active principle of aconite is imperfectly known to us, it results from general observations made on the family of vegetables to which it belongs, that this principle must be very fugacious. This is evident from the experiments of M. Braconnot, and the researches made by Bucholz. The natural consequence of this fact is, that the employment of heat should be sedulously avoided in all pharmaceutic preparations of aconite.

It may be asked, why then has the extract produced such marked effect, for the observations of Storck on this head cannot be overlooked or doubted. Experience has explained to me this apparent contradiction between the chemical theory, and the clinical results. This is, that contrary to the opinion of M. Braconnot, the volatile active principle is not entirely dissipated except at a high temperature. I have distilled the tincture of aconite made with the fresh plant, so as to separate all the alcohol; a fluid remained in the still, the poisonous qualities of which were satisfactorily tested, but these were destroyed by evaporation in a water bath. It is well known that Storck recommended the virous extracts to be evaporated at a very low temperature, advice that, unfortunately, has almost always been neglected. By attending to it, a portion of the volatile matter is preserved, and the extract has marked properties. Physicians justly consider this remedy as very uncertain. Independently of the deterioration produced by erroneous preparation, this uncertainty also arises from the nature of the active principle. It is impossible for any extracts of this nature to be always identical, or to contain the same proportions of active ingredients.

The tincture of aconite made with the fresh plant, is the only preparation which should be prescribed. By using it,

the remedy can be employed at all seasons of the year, and it can be always made of the same strength.

In the German pharmacopœias we find a formula for this tincture, by the mixture of equal parts of the fresh juice and alcohol. I nevertheless prefer the following :—

Fresh plant, bruised, - - - 10 parts.
Alcohol, at 36°, - - - - - 8 do.

Macerate for a week or ten days.   Express and filter.

Journ. de Pharm.

ART. XXIX.—ON IODIDES OF LEAD.
By M. Denot.

The halogene bodies occupy an elevated rank in the electro-negative scale. Among the salts which result from their combinations with the metals, some possess a considerable electro-negative force; and many combine with bases, but it is observable that they always unite with the oxide of the metal which is already the electro-positive element of the haloid salt. The basic chlorides and fluorides are the best known; their composition is of such a character that the metal of the oxide is to that of the haloid salt as 1, 2, 3, 7, is to 1. The result of the experiments now to be detailed, proves that analogous combinations exist between the iodide and oxide of lead. In those which I have observed, the lead of the oxide is to that of the iodide, as 1, 2, 5 is to 1. Before entering into a detail of these experiments, it may be useful to say a few words on the present state of the question.

Soon after M. Courtois discovered iodine, the distinguished chemists who studied its properties, indicated a combination of this body with lead. They obtained this, either in a direct manner, or by treating a solution of a salt of lead with an alkaline iodide. The iodide of lead was immediately afterwards employed in medicine, and its preparation in the shops

gave rise to some remarkable observations. M. Berthemot discovered its solubility in boiling water, and determined to 1-196 the quantity which water could thus dissolve.* Four years afterwards, M. Caventou made the same discovery, and added, that in pursuing the treatment with boiling water on an iodide obtained from the neutral acetate, that it was finally converted into a whitish insoluble powder, which he supposed to be subiodide of lead. M. Henry observed that when the iodide is prepared by pouring in a gradual manner a solution of the acetate of lead into a diluted one of the iodide of potassium, towards the close of the operation, there is a precipitate in brilliant crystalline waves; he ascertained that this phenomenon was owing to an acid reaction which developed itself in the fluid, and he indicated that crystallized iodide of lead might at once be obtained by mixing some drops of acetic acid to the diluted solutions above mentioned. The same chemist also announced, that the pulverulent precipitate of a whitish yellow colour, contained a subiodide. He analysed it, and found that there was in fact rather more lead than in the neutral iodide.

M. Henry made the important remark that the iodide obtained with the nitrate of lead is wholly soluble in boiling water, whilst that obtained with the acetate leaves a considerable residue in the form of a whitish yellow powder.

These facts being established, I commenced by studying the phenomena of the precipitation of salts of lead by the iodide of potassium, and arrived at the following conclusions :—

1*st.* All the neutral, soluble salts of lead, treated with iodide of potassium, give a precipitate of a beautiful orange yellow colour; the iodide of lead thus obtained is entirely soluble in boiling water. If the solutions are much diluted, and the solution of the salt of lead be gradually added to that

* Mr. P. Boullay, in his memoir on the double iodides, which was anterior to those of Messrs. Berthemot and Caventou, indicated the solubility of iodide of lead obtained from the nitrate, in boiling water.

of the iodide, the precipitate which does not at first appear, is afterwards developed in brilliant silk like waves, and gradually falls to the bottom.

2*d.* If instead of a neutral acetate, an acetate slightly basic, still having an acid reaction on litmus, be used, and gradually added to the iodide of potassium, the first portion of the precipitate is of a pale lemon yellow colour, and insoluble in boiling water ; but the acid reaction soon augments, the colour of the precipitate becomes gradually darker, and finally equals that of the iodide obtained with the neutral salts. It is then wholly soluble in boiling water, and when all the salt of lead has been thus decomposed, the acid reaction has completely disappeared.

3*d.* If a triacetate of lead be precipitated by an excess of iodide of potassium, the precipitate is of a whitish canary yellow, and completely insoluble in boiling water.

All these products may therefore be divided into two classes, according to the action of boiling water upon them ; the one soluble and crystallisable, the other insoluble and pulverulent.

I first examined the crystallized iodide to assure myself of its identity, in the following manner :—The iodide of lead was mixed with about forty parts of water, and the temperature gradually raised to the boiling point; I then added nitrate of silver as long as any precipitate took place ; the iodide of silver, collected, washed and dried, gave the weight of the iodine. The original fluid added to the washings was first treated with chloride of sodium to separate the excess of silver, and then with sulphuretted hydrogen ; the sulphuret of lead, collected, washed and dried, gave the weight of the lead. Three analyses were thus made. The first of a crystallized iodide, obtained by treating the precipitate procured from a neutral nitrate with boiling water. The second, of an iodide obtained from a neutral acetate. The third, of a crystallized iodide, obtained by treating the precipitate arising from a slightly basic acetate, with boiling water. The following is the result, operating on two grammes :—

	No. 1.	*No.* 2.	*No.* 3.	*Mean of*
Iodide of silver,	2.03	2.05	2.03	3 *experiments.*
Sulphuret of lead,	1.02	1.01	1.03	
Iodine,	1.094	1.104	1.094	1.097
Lead,	0.882	0.874	0.891	0.882
Total,	1.976	1.978	1.985	1.979

The formula (2 I. Pl.) gives:

Iodine,	1.099
Lead,	0.901
	2.000

The difference between these numbers is too trifling to attribute it to any thing but the imperfection of the analyses; the crystallized iodide of lead is therefore identical with the neutral iodide.

When obtained from neutral salts, it is a deep orange yellow powder. At ordinary temperatures it is soluble in 1235 parts of water; contrary to the assertion of M. Henry, acetic acid does not augment this solubility, which suffices to explain the crystalline form of the precipitate arising from diluted solutions of neutral salts. At the boiling point it is soluble in 194 parts of water.

The following is the mode by which I determined these two points of solubility : distilled water was boiled with an excess of the iodide. The boiling liquid was filtered, received in a matrass, and concentrated by boiling until some crystalline particles were perceptible; on suspending the boiling it immediately crystallized. The matrass was then closed till the contents were quite cool ; air was then permitted to enter, and the whole weighed; after standing for twenty-four hours, it was filtered to separate the crystallized iodide. The filtered liquid, of which the weight and temperature were taken, was precipitated by nitrate of silver; the precipitate collected, dried and weighed, gave the weight of the iodine, by which that of the iodide of lead was determined by calculation. These data sufficed to calculate the

solubility, both at ordinary temperatures, and at that of ebullition. This method, although apparently complicated, is nevertheless very simple and readily executed ; I believe it to be exact, for three repetitions of the experiments gave me results which scarcely differed from each other.

The solution of iodide of lead is entirely colourless, notwithstanding the assertion of Berzelius who states that it is yellow. On cooling, the iodide crystallizes in brilliant spangles of a magnificent golden yellow colour. If this crystallization be performed in a test tube and closely examined, it will be seen that these spangles are perfectly regular hexagons, but they are so thin and flexible that when they come in contact with each other, they unite and their symmetry is destroyed; when they fall to the bottom, they present the appearance of an aggregate of fragments of no definite form. When collected on blotting paper stretched on a piece of linen, the iodide at first adheres to it, but after drying the whole can be removed in a sheet of the colour and brilliance of gold. The iodide when thus obtained is much more beautiful than when received on a filter.

It now remains to examine the pulverulent insoluble products of a more or less pale yellow colour. I first occupied myself with that obtained as a residue, when the precipitate arising from a slightly basic acetate is exhausted by boiling water. The circumstance of its formation in the presence of a basic salt of lead, joined to its property of affording a neutral crystallizable iodide when it is treated with acidulated water, did not permit me to doubt of its being a basic iodide. Two grammes were subjected to analysis, on the same plan as before, with the precaution of previously adding a little very diluted nitric acid, and I obtained,

	No. 1.	*No.* 2.	*Mean.*
Iodide of silver,	1.38	1.36	
Sulphuret of lead,	1.39	1.40	
Iodine,	0.743	0.733	0.738
Lead,	1.203	1.212	1.208
Oxygen, (calculated,)	0.047	0.047	0.047
Total.	1.993	1.992	1.993

Numbers which vary very little from those given by the formular $I^2 Pl^2 O$.

$$
\begin{array}{lr}
\text{Iodine,} & 0.741 \\
\text{Lead,} & 1.212 \\
\text{Oxygen,} & 0.047 \\
\hline
& 2.000
\end{array}
$$

We may therefore consider this body as a basic iodide, that is, the iodide is combined with the oxide of lead in such proportions that the lead of the oxide equals that of the iodide.

To fully understand the formation of this product, we may consider the salt which I have designated as slightly basic as a sesqui-acetate of lead, and on reaction on $(A^2 Pl^2) + (I^4 K^2)$ we have $(A^2 K^2) + (I^2 Pl) + (I^2 Pl + Pl)$ the acetate of potash remaining in solution ; the neutral and basic iodides of lead being precipitated ; but if this precipitate be treated with boiling water, the neutral iodide is dissolved, and the basic iodide remains, boiling water having no action on it.

Neutral acetate of lead, when exposed to the air, loses its acetic acid and becomes basic ; I am ignorant of the limit of this decomposition, but some neutral acetate which was exposed to the air for three weeks, at a temperature of from 60° to 87° F., was entirely transformed into a basic sesqui-acetate, a scarcely perceptible portion of carbonate being generated. In another experiment, the same salt was exposed for eight days in a stove gradually heated from 87° to 140° F. When treated with distilled water, a considerable quantity of carbonate of lead remained undissolved, and the salt in solution was a basic sesqui-acetate. These facts seem to prove that in the alteration experienced by acetate of lead when exposed to the air, that carbonic acid does not act on it till it is transformed into a basic sesqui-acetate. The sugar of lead of commerce, which is generally regarded as neutral, undergoes a similar decomposition. These observations explain the apparent anomaly between the facts detailed in the commencement of this essay, and those observed by other chemists, who assuming as neutral a salt which had been

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perhaps prepared for a long time, have stated that it gave a precipitate of iodide of lead which was not entirely soluble in boiling water.

The electro-negative force of iodide of lead is such, that if the neutral iodide be boiled in water with the carbonate of lead, carbonic acid is disengaged, and a basic iodide is formed.

I now pass to the examination of two precipitates obtained when the triacetate of lead is decomposed by the iodide of potassium, in such quantity that the whole of the salt of lead is decomposed. Two grammes of this, properly washed, and dried at 212° F., were subjected to an analysis, and gave :—

$$
\begin{array}{lllll}
\text{Iodine,} & - & - & - & - & 0.532 \\
\text{Lead,} & - & - & - & - & 1.346 \\
\text{Oxygen,} & & - & - & - & 0.070 \\
\end{array}
$$

The formula $I^2 Pl^3 O^2$ gives :—

$$
\begin{array}{lllll}
\text{Iodine,} & - & - & - & - & 0.558 \\
\text{Lead,} & - & - & - & - & 0.372 \\
\text{Oxygen,} & - & - & - & - & 0.070 \\
\end{array}
$$

$$\overline{2.000}$$

This body is therefore a bi-basic iodide ; that is, the metal of the oxide is to that of the iodide as 2 to 1; on reaction, $(A \, Pl^3) + (I^2 \, K)$ we have $(A \, K) + (I^2 \, Pl + Pl^5.)$

Acetate of lead treated in the same way with an excess of iodide of potassium, gives a quinque basic iodide ; that is, the lead of the oxide is to that of the iodide as 5 to 1; in fact, on the reaction of $(I^2 \, K) + (A \, Pl^5)$ we have $(A K) + (I^2 \, Pl + Pl^5.)$

These three basic iodides, dried *in vacuo,* or by exposure to a temperature of 212° F., retain the water combined with them, which they do not lose till this temperature is doubled. The quantity of this water is so great, that its elements are sufficient to transform the iodine into hydriodic acid and the lead into oxide of lead; so that, in this state, they may be considered with equal propriety to be basic hydriodates as iodides.

When subjected to the action of heat in a crucible, they all melt at 570° to 680°, and are soon decomposed, exhaling

a thick white smoke mixed with vapours of iodine. If the fusion be continued till no vapours are given off, an amber coloured and perfectly transparent glass is obtained, which is very elastic and endowed with great refringent powers.

To sum up what has been said:

1st. Iodide of lead is soluble in 1,225 parts of water, at the temperature of 60° F., and in 194 parts at the boiling part.

2d. That it crystallizes in regular hexagonal plates.

3d. That it can combine with oxide of lead in three proportions, in which the metal of the oxide is to that of the iodide as 1, 2, 5 is to 1.

4th. That these basic iodides retain so much water that they may be considered to be hydriodates as much as iodides.

5th. That in preparing iodide of lead, the nitrate of lead should be preferred to the acetate.

6th. That if a basic acetate be employed, and a portion of the product should refuse to dissolve in boiling water, a small quantity of acetic acid should be added.

7th. That acetate of lead when exposed to the air loses its acetic acid, that independently of the action of the carbonic acid, it is transformed into a basic sesqui-acetate, and the salt thus altered should not be employed.

In the course of the experiments I have made on the combinations of iodine with lead, I have formed a blue iodide, which I believe corresponds with the *oxide plombeux* of Berzelius.   *Journ. de Pharm.*

ART. XXX.—ON RHATANY ROOT.

By M. Soubeiran.

Rhatany is one of those remedies to which the medical profession are much indebted, and it is considered as one of the best of the astringent class for internal use. It is important, however, to obtain the expected results from it, that it should be used with proper precautions, and with a full knowledge of its powers.

Vogel, Gmelin, Peschier and Tromsdorff, examined this root, and if some points connected with its analysis are not completely elucidated, yet its chemico-medical history has been fully developed. Rhatany contains tannin in three states:—1st. Pure; in which case it is colourless, and possesses all its peculiar properties. 2d. In a state insoluble in water, resulting from the alteration of the tannin by contact with the air; in this state it has lost its solubility and astringency. 3d. In the form of extractive, this is a soluble combination of pure tannin with No. 2, and gives to the fluid preparations of rhatany their characteristic red brown colour. This root also contains a small proportion of gum, a little fecula, some saccharine matter, and an acid whose properties are not yet fully determined.

It is generally used in decoction or in extract, each of which forms may be modified to meet the exigencies of the case.

Water acts on rhatany root in different manners, according to the temperature at which the preparation is made. The decoction is a fluid of a dark red colour and astringent taste, and which becomes more or less turbid on cooling. The infusion is much less highly coloured. It is of a reddish yellow; and judging from its appearance alone, its efficacy would be said to be much inferior to that of the decoction, but on tasting the two preparations, another opinion would be formed. Notwithstanding the light colour of the infusion, its astringent taste greatly surpasses that of the decoction, and in fact is the most energetic preparation. When rhatany is placed in tepid water, this is absorbed by it, and dissolves all the soluble tannin, the gum and saccharine matter, but if its action be prolonged, the teguments of the fecula are torn, and the soluble matter enters into combination with the tannin and dissolves it; at the same time, the soluble tannin becomes saturated, as it were, with No. 2, spoken of above, and an additional quantity of this latter is formed by the oxidizing action of the air. The decoction is dark coloured, and at the same time but little charged with the active principle on the one hand, because the effects of tannin are di-

minished by its union with the insoluble matter and fecula, and on the other because the vegetable fibre becomes saturated with it, and contributes to abstract it from the solution. This solution becomes turbid on cooling, by the precipitation of a part of the insoluble matter, and by the separation of tannate of starch, which is not soluble in water below 122° F.

The *Codex* orders the extract to be prepared by exhausting the root with alcohol at 22°, and evaporating this tincture to get rid of the vehicle. In endeavouring to ascertain why the Codex has made choice of alcohol, we have supposed it was with the intention of diminishing the chances of any alteration of the tannin, as the evaporation can be for the most part carried on in close vessels and at a low temperature. But we here have an instance of the inconvenience of adopting the best founded theoretical principles, when their applications have not been confirmed by a special reference to existing circumstances.

I prepared four different extracts, one by decoction in water; one by infusion, another with alcohol at 22°, and the fourth with alcohol at 33°. I repeated this with different roots, and obtained the following general results. Alcohol at 33° and at 22°, furnished the greatest proportion of extract. The decoction gave less, and the infusion a still smaller quantity; but when the medicinal value of these preparations are considered, the results are widely different. The extract by infusion contained 90 per cent. of soluble matter, that by decoction gave 40 per cent. of insoluble remainder. In the alcoholic extract made with the excipient at 33° there was from 60 to 75 per cent. of soluble matter, this was rather less when alcohol at 22° was used.

In the extract by alcohol at 33°, all the soluble matters contained in the root are to be found, with the exception of a small proportion of the gum and fecula; the evaporation being made in a closed vessel, the tannin was unaltered, and hence the extract represented all the pure tannin which the root originally contained. Alcohol at 33° is in fact the vehicle which furnishes the largest proportion of tannin, but it then is mixed with the matters insoluble in water.

That obtained by alcohol at 22° is very analogous to the preceding, except that it contains more of the gum.

Decoction caused a great loss of tannin. Many circumstances combined to occasion this; the fecula which unites with one part, the ligneous fibre which becomes saturated with it, and the prolonged action of air and heat, all tend to diminish the quantity in the preparation. The insoluble matter is here a mixture of two different bodies; No. 2, which is soluble in alcohol, and the compound of tannin and fecula, which is not.

The extract by infusion is richest in soluble matter, the water only takes up what is permanently soluble, and hence the extract itself is wholly soluble in that fluid, with the exception of the small portion which has become oxidized during the evaporation.

It results from what has been said, that the extract made from the infusion is to be preferred, as it contains the greatest proportion of the active principle. At the same time, I would observe that the relative quantities of soluble and insoluble matters contained in an extract of rhatany are of course variable, as each root furnishes different proportions, and also that the manner in which the operation is conducted, materially influences the results.

Journ. de Pharm.

ART. XXXI—ON THE MANUFACTURE OF SULPHURIC ACID, AND ON THE WHITE CRYSTALLINE SUBSTANCE WHICH IS FORMED DURING THAT PROCESS. By S. L. Dana, M. D.

To Richard Phillips, Esq.

Dear Sir—I send you the remarks on the manufacture of oil of vitriol, which I had the pleasure of reading to you in your laboratory this morning. I made the observations in the winter of 1831, at the laboratory of the Newton Chemical Company near Boston, in the United States of America. I had not at that time met with Dr. Henry's analysis of the white solid

which is occasionally found in the lead houses in this country; but the analysis which I made of the substance to which the following remarks refer, showed its composition to be similar to that stated by Dr. Henry. My experiments were directed chiefly to the effects of the formation of this crystalline substance in the lead houses. Such as they are, I submit them to your disposal. Very truly yours,

<div align="right">SAMUEL L. DANA.</div>

London, June 12, 1833.

The solid is confusedly crystallized in needles, or aggregated in crystalline grains, which appear like those produced in some sublimations. I have observed it also in flat four-sided prisms an inch and half long, and in interlacing filaments from three to five inches in length.

1. Dissolved in a small portion of water, violent effervescence occurs, and red fumes appear as gas escapes from the water. The same phænomena occur if dissolved in a large quantity of water, except that the red fumes *are less* abundant : the water becomes deep blue, which changes to green, and finally the water becomes yellowish. If the solution of the crystalline matter is largely diluted with water, the colour disappears, but always at the point of solution ; at the point of contact, between the solid and the water, there the colour is blue, at the moment of escape of gas from the solid. The green coloured solution effervesces strongly on further dilution with water, giving off deutoxide of azote, and becomes blue green.

2. All the above phænomena appear if the experiment is made in an atmosphere of hydrogen, nitrogen, or carbonic acid gas, but the red fumes are less abundant.

3. If the crystalline solid is laid on snow, it tinges it immediately deep blue. There is no escape of gas. It melts the snow and sinks in it like hot iron, the temperature falling at the same time. From $+30°$ to $-16°$ is the greatest reduction which I have observed; at $-16°$ the solid appears not to be acted upon, and the blue tinge gradually disappears.

4. The solution in water was found to be sulphuric acid, nitrous acid, and deutoxide of azote.

5. The solid dissolves very slowly in oil of vitriol of sp. gr. 1.84; a few bubbles of air escape. The solution contains nitrous acid, which cannot be driven off by boiling.

6. It dissolves with effervescence, greater or less, according to the density of the oil of vitriol. Effervescence is brisk when the sp. gr. of the oil of vitriol is from 1.35 to 1.45. In oil of vitrtol of sp. gr. from 1.60 to 1.70 it is difficultly soluble, and there is very little escape of nitrous vapour; the solution becomes pale yellow like nitrous acid. At +60° Fahr. gas partially escapes, and this is again reabsorbed as the temperature falls. At +35° to 20° Fahr. no gas escapes from the solution, nor can concentration of the solution expel all the nitrous acid.

7. When the solid is dissolved in oil of vitriol of sp. gr. 1.060, the immediate decomposition of the nitrous acid is prevented: the process goes slowly on. About fourteen days are necessary for the complete evolution of all the deutoxide of azote arising from this decomposition; bubbles of gas escape during the whole time; yet when these cease, nitrous acid is found in the solution; no agitation drives it off, nor will sulphurous acid gas decompose it.

8. If a current of sulphurous acid gas is passed through a green-coloured solution of the crystalline solid in water, this colour is discharged, and the solution becomes pale yellow: effervescence takes place throughout the whole liquid; nothing but deutoxide of azote escapes.

The action of water in forming sulphuric acid, seems to me to have never been rightly understood. It is well known that the above-mentioned white solid cannot be produced by nitrous vapour and sulphuric acid gas, unless water is present. What then is the action of water? I suppose that by it, red nitrous vapour is decomposed into *nitric* and hyponitrous acids. The *nitric* acid is immediately decomposed by the sulphurous acid gas, sulphuric acid and hyponitrous acid result; these unite with the water and form the white crystalline solid. I explain the above phenomenon, and some facts

which occur in the manufacture of oil of vitriol, as follows:—

It is evident from Experiment (2) that the effervescence is due *in part* to the escape of nitrous vapour : the deutoxide of azote also escapes, arising from the decomposition of hyponitrous acid, by the action of water. In oil of vitriol this decomposition is either prevented or retarded ; hence there is less of the red-fume appearance according to the density of the oil of vitriol, none appearing in concentrated oil of vitriol. At the moment of the solution of the solid in water, the hyponitrous acid gives it a blue colour ; but this acid is immediately decomposed into the nitric and nitrous acids, and deutoxide of azote. The nitrous acid being yellow, converts the *blue* to *green,* and this last colour is probably deepened by the presence of deutoxide of azote, such being the fact, with respect to saturating nitrous acid with deutoxide of azote. But the nitrous acid is yellow ; hence as this preponderates, the solution finally becomes yellowish.

The nitric acid, and a portion of the deutoxide of azote are retained by the water. Hence in starting a new lead-house, or whenever *fresh* water is used, there is withdrawn at once a large portion of that element which is essential to the acidification of the sulphurous gas; it is withdrawn either as nitric acid, or as deutoxide of azote. As the water of the lead-house becomes slightly acidulated by sulphuric acid, part of the *nitrous* acid is also retained by it (7) ; it undergoes no further decomposition. As the chamber absorbs sulphurous acid gas, this acts on the *deut*oxide of azote, and *prot*oxide* is the result; it acts on the nitric acid, the usual decompositions occur, and we have the nitric and nitrous acids and deutoxide of

* I have been led to the belief, from some results in the large way, that such a change may occur. Some say it actually does, and attribute it "to the too violent action of the water." Since I have been in London, I have learned from Dr. Turner's Chemistry, 4th edition, that Gaultier de Claubray has made experiments on this white solid, and observed that a little *nitrogen* gas is always disengaged when the solid is produced : it is doubtless owing to the cause above stated. It deserves further investigation, and its production is probably owing to peculiar circumstances, and is the cause of the great variation of the products sometimes noticed by the manufacturers.

azote produced. As the acidulated waters of the lead-house increase in density, less sulphurous acid is absorbed, and the nitrous acid is retained, undergoing no further change. Hence we easily account for the fact, that little sulphuric acid can be obtained by using fresh water in the chambers. The nitrous acid vapour is withdrawn, being changed into nitric acid, deutoxide and protoxide of azote, and being itself partly retained as such.

The white solid, I suppose is formed in every part of a lead house, and falls like hail into the water or acid on the floor. Cold condenses the moisture of the lead house; and I have generally observed the formation of this substance to take place either at the escape valve, or on the sides of the house, when the thermometer falls to 40°. When the thermometer sinks to 0, its production is very rapid; and in long continued very cold weather it concretes on the walls of the lead house from a half to one inch in thickness. The effervescence is not observed at first in the vast body of water in the lead house, because, as the nitrous acid is decomposed, the deutoxide is retained; as the density of the liquid increases, effervescence begins. It is very perceptible at the sp. gr. **1.29**; and at **1.33** it is in its greatest vigour. The acidulated water is then filled with nitrous acid and deutoxide of azote. If it is poured from one vessel into another, it foams like beer. It hisses and boils in the lead house, and the surface of the liquid is covered with froth, and fermentation seems to pervade the whole mass (as in experiment 8.) But the manufacturer of oil of vitriol may sustain loss by allowing the gravity of house acid to become too high, say to **1.60**. The experiment (6) will show that; and if the gravity is allowed to reach that degree, the solid, as it falls into it, will undergo but partial decomposition. The nitrous acid will be retained; and as there is little absorption of sulphurous acid gas, the nitrous acid is little acted upon; it is drawn off with the oil of vitriol, and does not wholly quit it unless the oil of vitriol is combined with a base. When the acid is drawn from the lead house at sp. gr. **1.25** to **1.30**, it gives off copious fumes of sulphurous acid, because enough of the solid has not been

precipitated into it to convert the absorbed sulphurous into sulphuric acid; nor is it probable that sufficient nitrous gas can be absorbed, as such, from the chamber already filled with sulphurous gas, to effect such a change: it can be effected only by having the white solid put into it. If acid is drawn from the lead house from sp. gr. 1.35 to 1.40, then it it is filled with deutoxide of azote and with nitrous vapour; we perceive this by its smell when the acid is boiled. When acid is drawn from the house at sp. gr. 1.60 and upwards, very little decomposition of the solid having taken place, we then see the red vapour fill the retort neck, when the acid is concentrated; but we do not smell it when the acid is boiled in a leaden kettle; it requires probably a higher degree of heat than that of the kettle, to drive off the nitrous acid; it is not all driven off even by concentration.

It is evident too from the effects of cold in Experiments (3) and (6) that the hyponitrous acid is not decomposed at low temperatures, or when decomposed, the gas resulting is retained by the liquid. Hence, in very cold weather, part of the crystalline solid is collected on the walls of the lead-house; that which falls into the liquid is less easily decomposed, and when decomposed, its gases are more readily retained. This is the reason why the manufacturer suffers; his product of acid is less, because the sulphurous acid gas, not having nitrous vapour to mix with and precipitate it, escapes dry and almost invisible. The great truths are well known, that in the manufacture of oil of vitriol, loss always occurs, when fresh water only is used in the lead-house, or when the weather is very cold, or when the gravity of the house-acid is too high. The best results are obtained by an even temperature of 50° Fahr. Steam cannot be used to obviate the inconveniences of cold, unless applied to heat the acid liquid in the house; for unless the temperature of this is kept up, the mere warming of the walls would be immaterial. Too much steam injected into the chamber lessens the product of acid, it acts like fresh water, rendering the nitrous vapour useless.

According to the above view of the formation of sulphuric

acid, there ought not to be any nitric acid in the liquid drawn from a lead-house: it ought to be wholly decomposed by sulphurous acid. Yet it is well known that nitric acid is found—and on Mr. Gay Lussac's theory ought to be found—in the house-acid. This is, however, accidental; it may be always prevented. It requires time only to effect the total decomposition of all the nitric acid;—by time, I mean, continuing the process so long that sulphurous acid shall be constantly present in the house, and that the gravity of the house-acid be not too low. If the gravity is low, the nitric acid formed will of course be very weak: it is then to be determined whether sulphurous acid gas will decompose this weak nitric acid. I distilled $\frac{1}{2}$ ounce of nitrate of potash with $\frac{1}{4}$ ounce of oil of vitriol, sp. gr. 1.84, diluted with its bulk of water. The acid vapours were received into $2\frac{1}{2}$ ounces of water. The acidulated water acted rapidly on copper; a current of sulphurous acid gas was passed through it; a few bubbles of gas escaped, probably deutoxide of azote. The liquid was saturated with sulphurous gas: it then acted not upon copper; a small portion of oil of vitriol, sp. gr. 1.84, was added to it; violent effervescence occurred, sulphurous acid gas escaped, followed immediately by red nitrous vapour. The liquid changed to a deep yellow colour, and acted rapidly on copper. The nitric acid therefore was not decomposed in this case till the added oil of vitriol had abstracted a portion of water,—an effect equivalent to the concentration of the nitric acid. The experiment was repeated, using undiluted oil of vitriol. The gas from 1 ounce of nitre, $\frac{1}{2}$ ounce of oil of vitriol, sp. gr. 1.84, was received into 4 ounces of water; the gravity became 1.036, and the liquid was slightly tinged yellow. Sulphurous acid gas was passed through it, and a brisk effervescence took place; deutoxide of azote was evolved; the yellow tinge disappeared. The effervescence ceased in about four hours. The liquid was saturated with sulphurous gas; its gravity became 1.060. The apparatus stood some days; sulphurous gas was repeatedly passed through the liquid at different temperatures, from 32° to 212° Fahr. It had the same character with copper as above stated; a por-

tion of the liquid, mixed with pure muriatic acid, rapidly dissolved gold; the nitric acid was therefore undecomposed. Common aqua fortis, diluted to sp. gr. 1.08, treated as above with sulphurous acid, was not decomposed.

The effervescence observed in these experiments is owing to the decomposition of *nitrous* acid; for if the liquid is boiled, red nitrous vapour escapes, and sulphurous acid no longer causes any effervescence. It is deutoxide of azote only which escapes during the effervescence; and during the boiling, no red vapours appear if free oxygen gas is excluded from the vessel. The above experiments were reversed by passing the vapour from sulphuric acid and nitre over a weak solution of sulphurous acid in water. No effervescence took place, except when a drop of *strong* nitric acid fell from the beak of the retort into the liquid. The nitrous acid vapour was rapidly absorbed by the sulphurous acid solution, and whatever nitric acid was formed by the action of the water remained undecomposed.

It is evident that by adding oil of vitriol to weak nitric acid in a solution of sulphurous acid gas in water, the nitric acid can be decomposed : the oil of vitriol acting to concentrate the nitric acid. Now, in the manufacture of oil of vitriol, either by intermitting or continuous combustion, nitric acid is formed by the action of the house-acid water, either on the white solid, or on the absorbed nitrous vapour. As the lead-house acid increases in gravity, it is equivalent to adding oil of vitriol to weak nitric acid : hence, if the process be continued long enough, all the nitric acid will be decomposed : the proper remedy is, to burn sulphur only, to add sulphurous acid gas alone. The decomposition of the nitric acid seems to be perfected when the house-acid is of a *dark-brown* colour, a change owing to the absorption of sulphurous acid gas. I made a solution of the crystalline solid in water, and passed a current of sulphurous acid gas through it, to test the truth of the above opinion. By continuing the action of the sulphurous acid gas till all effervescence was over,—from green the liquid became brown, and showed no trace of nitric acid. Pale yellow acid is not uncommon in a lead-house. I have

seen it also deep *green* and deep yellow. At the sp. gr. 1.58 or 1.53, all these coloured acids effervesce briskly : when a current of sulphurous acid gas is passed through them, they become light coloured, white, and then speedily turn brown; the action ceasing, there are no traces of nitric acid in them. The dark colour of lead house acid is then evidently due to absorbed sulphurous acid gas. When all the nitric acid is decomposed, the house acid is tinged only brown, and by boiling, the sulphurous acid, which it holds in solution, is driven off; as the workmen say, " the kettle clears off," the liquid becomes pellucid. As long as there are any bubbles in the liquid from the chamber, the nitric acid is not wholly decomposed; the colour and appearance then are important guides to the manufacturer at what period to draw off his acid. A quiet, still, pale brown liquor is the desirable point. If the acid is drawn from the lead house after a few days' burning, torrents of sulphurous acid gas are then evolved by boiling : the nitric acid is here too weak to decompose the sulphurous acid gas, absorbed by the water of the house. If W denote the colour to be white, D dark, X traces of nitric acid, and O its absence, then the following will denote the number of drawings or lead kettles full from lead houses under my superintendence. I tested each lot to ascertain the presence of nitric acid.

$$
\begin{array}{rll}
11 \text{ times} \dots\dots\dots & \text{W and X} \\
1 \quad — \quad \dots\dots\dots & \text{W} \; — \; \text{O} \\
10 \quad — \quad \dots\dots\dots & \text{D} \; — \; \text{O} \\
2 \quad — \quad \dots\dots\dots & \text{D} \; — \; \text{O}
\end{array}
$$

One house gave 7 D and O

4 W and X; its product of acid was 2.75 pounds for one pound of sulphur burned.

Another house gave W and X all the time ; its product was 2.67 of acid for one pound of sulphur.

Lon. and Edin. Phil. Mag.

ART. XXXII.—AN ACCOUNT OF SOME EXPERIMENTS MADE WITH MR. JOS. SAXTON'S ELECTRO-MAGNETIC MACHINE. By JACOB GREEN, M. D., Prof. of Chem. in Jefferson Medical College.

SINCE the publication of Mr. Saxton's electro-magnetic machine, contained in the last number of the Journal, Mr. Isaiah Lukens, with his usual ingenuity, has converted the immense artificial magnet belonging to the Philadelphia Museum, into an apparatus for producing electrical currents. The magnet, it is well known, will permanently support a weight of 134 pounds.* The length of the copper wire covered with silk, which surrounds the keeper, or armature, is 400 feet. It was expected that by thus increasing the size and magnetic power of the apparatus, that corresponding electrical effects would be produced, but except in two or three experiments, they were nearly the same as those exhibited by a much smaller instrument in my possession.

The following experiments, made with the large apparatus in the Philadelphia Museum, will no doubt be interesting to those who are curious on this subject; they were made in conjunction with Mr. Titian R. Peale, to whose kindness and skill they are chiefly to be ascribed.

The Spark.—The appearance of the spark, when the keeper revolves in mercury, is very much like the spark produced by the rotation of copper wheels in that liquid, when under the influence of an ordinary electro-magnetic current; it is perhaps brighter, and when reflected from white surfaces, strikingly resembles the corruscations of the aurora borealis. When reflected from pale blue or pale green surfaces, its colour is not at all changed. In my small machine, which is very active, the spark only appears at the moment the *cross bar* leaves the mercury, but in the large apparatus it is seen both at the *wheel* and at the cross bar.

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* *Description of the Magnet in the Philadelphia Museum.*—It consists of fifteen bars, weighing fifty-three pounds, which required, on the first trial, 310 pounds weight to overcome the attractive force. Its permanent power is 134 pounds, and it now supports a weight of eighty-four pounds.

October, 1825. F. PEALE.

Fusion of Metals.—When the communication between the cross bar and the wheel is made by other metals besides quicksilver, small portions of the metals appear to be fused. In order to produce these effects, a thin flat piece of the metal, about an inch broad, and rounded at the ends, must be bent in the form of an arc, and applied to the cross bar and the wheel as they revolve; the little basin of mercury being previously removed. When a strip of *lead* is used, small bluish spots of light are produced. *Zinc* occasioned a spark very much like that from the lead. When a *copper* arc was used, the light was coloured, but whether it was green, as we expected, could not be satisfactorily determined. The light from *silver* differed but little from that produced by zinc. A strip of *artificial silver* (copper and nickel) had the same effect. A piece of *tin*, or tinned iron, gave out pencils of a beautiful variegated light. With a piece of *steel*, the experiment was striking in a high degree; flashes, corruscations and sparks, were thrown off brilliantly in every direction, not unlike the combustion of a steel wire in oxygen gas.

It is a little remarkable, that broad flat surfaces must be used in these experiments, for when blunt points form the connexions there is scarcely any light whatever produced.

Effect on Inflammable Bodies.—A jet of hydrogen gas was thrown for some time on the spark produced when the cross bar left the mercury, when that liquid was used to form the communications, but it could not be ignited. Strong ether, which is so easily inflamed by a small electrical spark, was then poured on the surface of the mercury in the little basin, and a spark was thus made to pass through it, but no combustion ensued. The power of the instrument was, however, very much impaired, as long as the ether remained on the surface of the mercury.

Decomposition of Water &c.—All our attempts to decompose water have entirely failed. We used an instrument similar to the one described by Mr. Saxton, at page 156, but not a bubble of gas could be observed. Besides pure water we used several saline solutions, which are better electrical conductors, but with the same results. We expected to revive

the metal on one of the platinum wires when a solution of the acetate of lead filled the tubes, but we were disappointed. Supposing that points did not discharge the *fluid* as well as surfaces, we introduced into the decomposing tube, strips of silver, but without effect. Perfect contact between the wires from the tube and the wheel and cross bar, was particularly attended to, besides other means resorted to, a septum, or division was made at the suggestion of Mr. Lukens, in the little basin which contained the mercury, so that the wheel revolved in one half of the mercury, and the cross bar in the other, without communicating with each other—the amalgamated wires from the tube being also in different parts of the basin; but still no visible effect was produced on the liquids in the tube.

The Shock.—When two wires are pointed at the ends, and one end of each applied to the upper and under surface of the tongue, the opposite extremities being in contact with the cross bar and wheel, a very feeble shock is felt; but when the arrangement was made in the manner described by Mr. Saxton, a powerful shock was experienced, passing through the tongue from one place to the other. If, while the insulated plates in the above experiments are applied to the tongue, the upper lip be made to touch the upper plate, the muscles of the upper part of the face will then be slightly convulsed—the usual shock being at the same time produced. If one of the plates, or disks, be applied to the tongue, when the other disk is inserted between the upper jaw and the cheek, a convulsive motion will then be produced in the muscles of the mouth, accompanied by an acid taste, and at the same time a flash of light, as in the common experiment with the zinc and silver plates. From these experiments it is highly probable, that this instrument may be advantageously used, in certain cases of disease, instead of the common electrical apparatus.

Effect on the Galvanometer and Electrometer.—With my small machine, made by Mr. Lukens, the needle of the electro magnetic multiplier was made to place itself at right angles to

I

the magnetic meridian, and by a little management a rapid rotation of the needle was produced. With the common electrometer no divergency of the leaves could be effected either with the small or the large apparatus. We were so confident of success in this experiment that it was not until all conceivable devices for the purpose had been resorted to in vain, that we gave it up as hopeless. Thus two strips of gold leaf were attached, one to each plate of the apparatus for producing shocks; then a single piece of gold, enclosed in a glass case with a solid strip of silver; these with several other arrangements, were all ineffectual.

Effects by Induction.—We succeeded in rendering a curved bar of soft iron magnetic, by wrapping, in the usual way, a copper wire, covered with silk, many times round it, and these connecting the extremities of the wire with the cross bar and wheel. The curved bar then acted as a horse shoe magnet, attracting by its inductive force, light ferruginous substances. The quantity of iron lifted was by no means as great as was expected. The power of magnetic induction in an electro-magnet is supposed to be in proportion to the *heat* produced in the wire : if that be true, it may account for its feeble manifestation in the above experiment. When a helix of copper wire, through which the electrical current was made to circulate, surrounded a straight bar of soft iron, the helix not being in contact with the bar, no induced magnetism could be detected.

In the ordinary construction of Mr. Saxton's magnetic machine, the mercury in the little basin forms the communication between the cross bar and the wheel. In my small apparatus, I removed the mercury, and endeavoured to form the connection between the bar and the wheel, by filling the basin with a number of saline solutions, but no effects were produced. The only advantageous change in the original form of the instrument, which we would suggest, is when exhibiting the *sparks*, to remove the basin of mercury, and to supply its place by an arc of steel, a circular piece of copper being then substituted for the cross bar. The details, in ar-

ranging this little contrivance, are so obvious as to need no further description.

We are fully satisfied, that the maximum power of the large machine in the Philadelphia Museum, has not been developed by its present arrangement. It is proposed therefore, to alter its form, in some respects, when further experiments will be made upon it.

Journal of the Franklin Institute.

ART. XXXIII.—CARBONIC OXIDE GAS, OBTAINED FREE OF CARBONIC ACID. By THOMAS D. MITCHELL, M. D. Professor of Chemistry and Pharmacy in the Medical College of Ohio.

IT will be readily conceded, that a process by which a difficulty can be avoided entirely, will be more acceptable to the practical chemist, than one, however ingenious, that instructs him how to get rid of that difficulty after it has occurred. Several foreign writers have recently proposed methods for ridding carbonic oxide of carbonic acid; and in a late number of the American Journal, conducted by Professor Silliman, I find a communication from Professor Hare, on this point. He has furnished a drawing of his apparatus, intended to accomplish the object in view, with such explanations as he supposed necessary. It is obvious, however, that if such an expedient were at all requisite, many persons would fail in its construction, by the aid of the description and drawing alone; for although it may be perfectly plain to the inventor, it will not follow that others may easily imitate him.
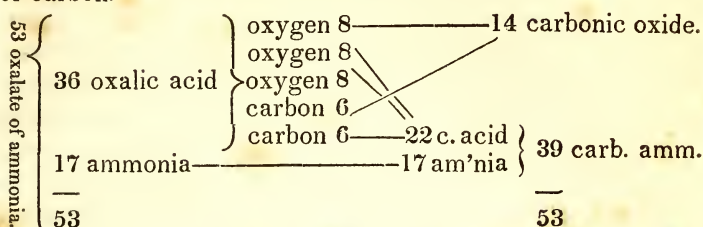
The plan which I adopted is very simple and perfectly successful. I was led to its use, not because I supposed the formation of carbonic acid would be obviated, but because I had found considerable difficulty by other processes. It was my design to have employed the super or bin-oxalate of potash, as recommended by Dumas, and in that case, it would have been necessary to have washed the product with lime water. Fortunately, however, my bottle containing that ar-

ticle was mislaid, and in its place I substituted the oxalate of ammonia, uncertain what would be the precise result. My first notice of this experiment is contained in the Western Medical Gazette for January 15th of the present year, but as I have had opportunities since that date of confirming the views then entertained, I think it may not be unacceptable to chemical teachers, to give the subject a brief notice, through the medium of a journal that has a wider circulation.

I repeat then, that I have obtained the carbonic oxide, of an excellent quality, independently of the use of lime water, or any other agent, for the purpose of detaching carbonic acid, by the action of sulphuric acid on the oxalate of ammonia. Take an ounce of the oxalate, reduced to powder, and a drachm or two of sulphuric acid, and put them into a six-ounce tubulated retort, and apply a very gentle lamp heat. In a few minutes, large quantities of gas are evolved, and may be collected in the usual manner over water. If the heat be duly moderated, the first and last products, as obtained in the receivers, will be pure carbonic oxide gas. The sulphuric acid seems to act by resolving the oxalate into oxalic acid and ammonia; then to decompose the oxalic acid into its elements, and to put the whole into such a state, as to enable the constituents to recombine, so as to form the pure gas. That carbonic acid is actually evolved cannot be doubted, but it seems to join the ammonia instantly, forming the carbonate of ammonia, which is absorbed by the water as fast as it is produced. If it is inquired, how it happens that the sulphuric acid does not instantly seize the ammonia and form a sulphate, I have only to say, that although the moderate heat employed is amply sufficient to drive over the gaseous elements of the oxalate, it is inadequate to cause the sulphuric acid to do so.

The above statement will be better understood by the use of a diagram; premising, that the equivalents or combining numbers of the several articles, are as follow :—oxalic acid 36, made up of 24, or 3 equivalents of oxygen, and 12, or 2 equivalents of carbon; ammonia 17, making the salt 53 ; carbonic acid 22, made up of 16, or 2 equivalents of oxygen,

and 6, or 1 equivalent of carbon; carbonic oxide 14, composed of 8, or 1 equivalent of oxygen, and 6, or 1 equivalent of carbon.

$$
\left.\begin{array}{l}
\text{53 oxalate of ammonia.}
\end{array}\right\{
\begin{array}{l}
\left.36 \text{ oxalic acid}\right\{
\begin{array}{l}
\text{oxygen 8} \text{------} 14 \text{ carbonic oxide.} \\
\text{oxygen 8} \\
\text{oxygen 8} \\
\text{carbon 6} \\
\text{carbon 6} \text{------} 22 \text{ c. acid}
\end{array} \\
17 \text{ ammonia} \text{------} 17 \text{ am'nia} \\
\overline{53}
\end{array}
\right\}39 \text{ carb. amm.}
$$

If a very gentle heat continued for some time, the same products will be had, independently of the use of sulphuric acid; but the latter seems to accelerate the process.

When we employ oxalic acid to make the carbonic oxide gas, a portion of carbonic acid is unavoidably formed, and must be removed by means of lime water. In like manner, this acid gas is generated or evolved, when the oxalate of ammonia is used, but as it combines instantly with the ammonia, it does not contaminate the desired product. A small portion of the carbonate of ammonia will be found along the beak of the retort, but for the most part, it is taken up by the water. The addition of a few drops of a solution of sulphate of copper to the fluid, strikes a blue colour instantly, thus denoting the presence of ammonia. On examining the residuary matter in the retort, it is found to be strong sulphuric acid. I know of no other rationale of this process, and think it quite satisfactory. Of one thing, however, I am certain, and that is, that no other method that I have employed, yields the gas in question, so pure, and with so little trouble. It is, therefore, confidently recommended to all operators in chemistry.   *Am. Journ. of Science and Arts.*

Cincinnati, Oct. 22, 1833.

ART. XXXV.—PHARMACEUTICAL APPARATUS.

[The subjoined description of a furnace &c. for various pharmaceutic purposes, is extracted from the *Journ. de Chim. Med.* for January, 1834. This apparatus is more complete and compact than any other hitherto spoken of in the works of pharmacy. We have also added a plate and description of an apparatus which serves as a still or furnace as may be required, and is spoken of in high terms as fully answering the purpose for which it was designed.

The furnace first alluded to has been used with the most complete success for some years past in Vienna, and its construction will we hope be fully understood by the accompanying plate.]

Fig. 1. View of the top of the furnace; this is a plate of tin about one-third of an inch in thickness, having the following openings: 1st. in the centre, one to receive a still, (fig. 4,) and 2d. four small apertures to hold vessels for decoctions &c. The two small holes serve to conduct the steam by means of a pipe into a copper reservoir, whence it passes into a vessel filled with water, where it is condensed.

Fig. 2. View of the apparatus placed in the furnace. In front is a glass tube adjusted in such a manner as to mark the height of the water in the boiler.

Fig. 3. Boiler of tinned copper or cast iron. This is to be filled with water to the height of 5 or 6 inches. This quantity is sufficient to furnish steam for most operations. This boiler is covered by fig. 1.

Fig. 4. Still of tin or copper, without its head, (which is represented by fig. 2.) This still occupies the large opening in fig. 1. Steam from the boiler is conducted into the still by means of the curved tube *a*, which passes through one of the small openings represented in fig. 1. At the lower part of the still, is a plate of tin, pierced with numerous holes and supported on three legs. This plate is intended for the reception of plants &c., to be distilled, the steam passing through

them becomes embued with their volatile parts, and rises into the head and thence passes into the refrigerator.

Fig. 5. Upper view of the pierced plate.

Fig. 6. Worm and refrigerator.

Figs. 7, 8, 9. Different vessels for pharmaceutic operations. These may be made of various sizes, to fit each of the openings in fig. 1, and should be provided with a cover.

In this apparatus, a number of pharmaceutic operations can be carried on at the same time, thus four decoctions can be made at a temperature of 200 F. and if the covers be used the head can be raised to 212 F., at the same time a solution can be evaporated, or a distillation made; tinctures requiring heat can be formed, by placing the vessels containing them on top of the furnace, powders dried &c. &c. The neatness with which operations can be carried on with this apparatus is also one of its recommendations, as there is no dust or dirt. No more water is used in making the decoctions or infusions than is absolutely requisite. Thus, nine ounces and a half of water, are sufficient for one ounce of sarsaparilla, the whole being covered for a certain time, (according to the temperature,) eight ounces of decoction will be obtained.

The air does not act on the substances in decoction, on this account many decoctions prepared in this apparatus are lighter coloured, clearer and more transparent, as the boiling is never so violent as when an open fire is used.

Journ. de Chim. Med.

Description of an apparatus which may be used for a furnace or still. By A. CHEVALLIER.

This apparatus is represented by the figures *A* and *B*, and is composed of a still *a*. 2d. Of a furnace with double sides *bb*. 3d. Of a refrigerator *d*. *Fig. A* Represents the apparatus disposed for a distillation. The substances to be subjected to this process, are to be placed in the still *a*, the vapour is carried by the curved tube *k*, into the refrigerator *d*, where they condense: the distilled water is drawn off by the cock *h*.

Fig. B. Represents the apparatus serving as an evaporating

furnace; a furnace which at the same time furnishes distilled water, the steam passing by the curved tube k, and condensing in the refrigerator g. The capsule f, now replaces the still a. A small door in the side of the furnace, serves to introduce fuel. At the lower part is an ash pit, which can be closed at will, so that the draught of air can be regulated.

This apparatus I have used a year in my laboratory, and have found it of great use, since which Mr. Gauthier de Claubry, has also had one made. The price varies according to the size; that for an apparatus of the usual dimensions is about 12 dollars, (60 frs.)   *Journ. de Chim. Med.*

ART. XXXV.—ON MINIUM.   By RICHARD PHILLIPS, F. R. S.*

AFTER the last sitting of this Society, the President mentioned to me a paper on Minium, by M. Dumas, contained in the 49th volume of the *Annales de Chime et de Physique,* dated April 1832.† In this memoir the author shows that minium is a very different compound from what it is usually supposed to be, and consequently that it is not a sesquioxide, or as it is sometimes termed, deutoxide of lead. Dr. Dalton also called my attention to his having previously announced the same fact in his New System of Chemical philosophy, published in 1827, (vol. ii. p. 39.)

Opinions so different from those commonly entertained, induced me to make some experiments on the subject, and an account of them may not be altogether unacceptable to this Society, tending, as they do, to confirm the views of the learned President, and proving their originality. Before I state the opinions of Dr. Dalton, or of M. Dumas, or my own experiments, it will be proper to give the generally admitted composition of the yellow or protoxide, and of the brown or

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* Read before the Literary and Philosophical Society of Manchester, early in the present year.

† An abstract of Mr. Dumas' results will be found in Lond & Edinb. Phil. Mag. vol. ii. p. 402.

peroxide of lead. Dr. Dalton in his work already alluded to, considers the protoxide as composed of 7 oxygen and 90 lead, and the peroxide of 14 oxygen and the same quantity of metal. Now as these differ but little from the atomic proportions usually adopted, I shall consider the protoxide as composed of an atom of oxygen $= 8 + 104$ an atom of lead, and the peroxide of $16 = 2$ atoms oxygen $+ 104$ of lead.

It is well known that when red-lead is treated with nitric or acetic acid, it is separated into protoxide, which is dissolved, and peroxide remaining unacted upon; and Dr. Dalton correctly observes, that if minium were a sesqui-oxide, it ought to leave more than 50 per cent. of peroxide when acted upon by either of the above named acids; the sample, however, which he examined left only 20 per cent. of peroxide, proving that it was a sesqui-oxide.

Dr. Dalton concludes from his experiments that " the minium of commerce is constituted of 1 atom of oxygen, holding 6 atoms of yellow oxide together; or it is composed of 100 lead and 9.07 oxygen." And he observes, that " when it is digested in cold acetic acid the residuum constitutes another oxide, consisting of 1 atom oxygen and 3 of yellow oxide, or 100 lead and 10.4 oxygen, possessing the same colour as the former, but distinguishable by its not being acted on by cold acetic acid, and by its containing twice as much brown oxide and extra oxygen as minium."

These experiments are, I confess, new to me, and certainly have not excited the attention which they merit; and without at present entering further into this part of the subject, I shall just state that I have found acetic acid to separate a large proportion of protoxide from minium, without altering its colour at all; and consequently proving that it is not a sesqui-oxide, for if it were, the residue would become brown by the developement of peroxide. If, however, the dilute acetic acid be used in excess, then this change actually occurs, at least so I found it; but this does not appear by Dr. Dalton's experiments.

M. Dumas in the paper above referred to, does not state the opinions of other chemists in detail, consequently it can-

not be ascertained whether he was acquainted or not, with those of Dr. Dalton; he merely says, that previous analysts do not agree as to the nature of minium. The facts stated by M. Dumas indeed prove the existence of several varieties of minium; and according to his experiments, which appear to have been conducted with great care, the increase of oxygen goes on very slowly from 8.26 per cent. in the product of the first calcination, to 8.79 contained in the minium of the eighth operation. He found also that white lead submitted to three calcinations gave a fine orange minium, containing 9.24 per cent. of oxygen; this, however, he observes, is still below the proportion required to constitute the lead a sesqui-oxide, and which, in fact, amounts to 10.38 per cent.

M. Dumas states minium of the eighth operation to consist of 75 protoxide, and 26 peroxide; that obtained by calcining white lead, of 66.8 protoxide, and 33.2 peroxide: and pure minium he considers as equivalent to 65.1 of protoxide with 34.9 of peroxide.

I shall now state the results of my own experiments on minium; that which I used appeared to be free from carbonate of lead, and was moderately dried before submitting it to the following experiments:—Two hundred grains were digested in an ounce of strong nitric acid, diluted with half a pint of water; 49.6 grs. of peroxide were left, consequently the minium was separated into

$$
\begin{array}{ll}
\text{Protoxide of lead} & \text{- - - - } 75.2 \\
\text{Peroxide of lead} & \text{- - - - } 24.8 \\
\hline
& 100.0
\end{array}
$$

I also boiled some of the minium with excess of moderately strong acetic acid; by this operation it was separated into

$$
\begin{array}{ll}
\text{Protoxide} & \text{- - - - - - - } 74.2 \\
\text{Peroxide} & \text{- - - - - - - } 25.8 \\
\hline
& 100.0
\end{array}
$$

These results do not differ much; but taking the mean, we have minium resolved into

$$
\begin{array}{lr}
\text{Protoxide} & \text{-\ -\ -\ -\ -\ -\ -\ } 74.7 \\
\text{Peroxide} & \text{-\ -\ -\ -\ -\ -\ -\ } 25.3 \\
\hline
& 100.0
\end{array}
$$

Now this result differs considerably from that obtained by Dr. Dalton; he procured only 20 per cent. of peroxide. The cause of this difference is readily explained by referring to M. Dumas's Table of Experiments; from which it appears that minium of the third calcination yields only 20.3 per cent. of peroxide; while that of the eighth gives 26 per cent. Dr. Dalton appears to have employed a specimen of the former, while I used one of the latter.

In order to determine the proportion of pure minium in the specimen which I used, I added separate portions of 200 grains each, to the annexed quantities of strong acetic acid, diluted with half a pint of water; viz. one, two, two and a half, and three drachms. I found that the minium digested in the first, lost 22 per cent.; in the second 27.5; and in the third 29.1 per cent.; and in all these cases the residue remained perfectly unchanged in colour; the quantity of protoxide dissolved by the fourth portion of acid I did not determine, for the residue had acquired a slight brown tint, showing that a portion of the pure minium had been decomposed. From these experiments I conclude that the maximum of protoxide had been dissolved by the acetic acid, and consequently that the specimen consisted of

$$
\begin{array}{lr}
\text{Pure Minium,} & \text{.\ .\ .\ .\ .\ .\ .\ .\ .\ .\ .\ } 70.9 \\
\text{Protoxide,} & \text{.\ .\ .\ .\ .\ .\ .\ .\ .\ .\ .\ .\ } 29.1 \\
\hline
& 100.0
\end{array}
$$

It now only remained to determine the composition of the 70.9 of pure minium. I therefore treated a portion of it with great excess of diluted nitric acid, by which it was separated into

$$
\begin{array}{lr}
\text{Protoxide,} & \text{.\ .\ .\ .\ .\ .\ .\ .\ .\ .\ .\ .\ } 66 \\
\text{Peroxide,} & \text{.\ .\ .\ .\ .\ .\ .\ .\ .\ .\ .\ .\ } 34 \\
\hline
& 100
\end{array}
$$

It will be observed that this determination agrees very nearly with that resulting from the action of nitric acid upon red lead. I have already stated that it gave 25.3 per cent. of peroxide, while, as will appear by a slight calculation, according to the action of nitric acid upon the *pure* minium, it should have yielded 21.4 per cent.

We may consider the constitution of minium under different points of view :—first, merely as a compound of lead and oxygen; in this case 104, an atom of lead appears to be combined with 9.8 of oxygen, which are proportions irreducible to any probable atomic constitution. Indeed on inspecting M. Dumas' Table of the composition of eight different kinds of red lead, it must be admitted that this substance is a mixture of true red oxide with variable proportions of protoxide.

The next question is, What is the constitution of the true red oxide? by which I mean that left unchanged by the action of dilute acetic acid upon common red lead.

Now I have shown that this is resolvable into 66 of protoxide, and 35 of peroxide; and these results agree very closely with those of M. Dumas, who states what he calls *pure* minium, to be composed of 65.1 protoxide, and 34.9 peroxide, which I agree with him in considering as equivalent to two atoms of the former, and one atom of the latter, or three atoms of lead and four atoms of oxygen. And I have great pleasure in observing that these results are in perfect accordance with the statement of Dr. Dalton, long since published; for he mentions that the red oxide, left after the action of dilute acetic acid upon common red lead, consists of an atom of oxygen and three atoms of yellow oxide, which are of course equivalent to four atoms of oxygen, and three of metal.

Philos. Mag.

ART. XXXVI. EXPERIMENTS ON THE ACTION OF LIME ON CERTAIN SOLUTIONS OF CARBONATE OF POTASH.

By HENRY HOUGH WATSON.

AMONG the miscellaneous articles in the London and Edinburgh Philosophical Magazine and Journal of Science for September 1832, will be found an extract from *Ann. de Chim.*

et de Phys. xlix. p. 142, in which M. Liebig states, that "if one part of carbonate of potash be dissolved in four parts of water, and the solution be boiled with slaked lime, the potash does not lose the smallest quantity of carbonic acid; it does not become caustic, even though lime be added to any extent, or however long the boiling may be continued." Now, as the first part of this statement is considerably at variance with the one which I should give, as founded on the result of my own inquiries, without further premise I venture to lay before the readers of the Philosophical Magazine a few experiments lately made on the same subject.

Exp. 1.   50 grains of pure dry carbonate of potash, prepared by exposing the bi-carbonate to a red heat, are dissolved in 200 grains of water (4 times the weight of the carbonate;) and to the solution are added 70 grains of protohydrate of lime.   The mixture is heated to boiling as quickly as possible, the whole heating operation only lasting two minutes.   The liquor is filtered while hot and undiluted, and a part of it treated with sulphuric acid, sp. gr. 1.135, of which 60 grain measures are required before effervescence takes place, and only 29 more for saturation; consequently ¾ths of the carbonate are decomposed by the lime.

The boiling point of the mixture is about 220°; but I find that a very material decomposition of the carbonate takes place even when a like mixture is exposed only to 150° for a quarter of an hour, being briskly agitated all the time.

Exp. 2.   61.4 grains of pure dry carbonate of potash = 1 atom, are dissolved in 320 grains of water = 40 atoms, or about 5 1-5 times the weight of the carbonate; and to the solution are added 90 grains of hydrate of lime: 57 grains more water are also added to the mixture as an allowance for the loss in boiling.   It is now heated up to boiling in 1½ minute, and kept boiling another 1½ minute, when it is found by weight that the additional 50 grains of water have evaporated.

The liquor is filtered while hot and undiluted, and part of it treated with sulphuric acid, such as before, of which 100 grain measures are required before effervescence takes place.

and only 5 more for saturation. In this case, therefore, the lime has only left 1-21 part of the carbonate undecomposed.

Exp. 3.   61.4 grains of pure dry carbonate of potash = 1 atom, are dissolved in 480 grains of water = nearly 8 times the weight of the carbonate, and to the solution are added 90 grains of hydrate of lime : 50 grains more water are also again added to the mixture. It is boiled as before, until the additional 50 grains of water are evaporated.

The liquor is filtered while hot and undiluted, and a part of it found to require 105 grain measures of the sulphuric acid for saturation; only a few minute bubbles of carbonic acid being given out.

It therefore appears that to obtain caustic potash, not fewer than about 53 atoms of water (besides what is combined with the lime to constitute the hydrate,) are sufficient for each atom of the carbonate.

The atomic weights here made use of are those of Dr. Dalton.

How M. Liebig arrives at the conclusion that carbonate of potash loses no carbonic acid when dissolved in only 4 times its weight of water, and boiled with slacked lime, I am not aware, except it is from the entertainment of some theoretical views. He explains the matter upon the fact that concentrated potash takes carbonic acid from lime. Though that may be the case, it is very evident, from the result of my first experiment, that the solution employed is not sufficiently strong to do so.

Considerable time has now elapsed since the statement in question was announced; but as nothing contrary has, as far as I know, hitherto been given, the above experiments and observations will not, I trust, be regarded as too late, when it is considered that the real intent of the publication is the correction of error.   *Phil. Mag.*

ART. XXXVII.—DESCRIPTION OF A NEW FORM OF THE
  STOMACH PUMP. By P. B. Goddard, M. D. of Philadelphia.

This pump consists of two parts, one of which I shall call
the valve box, the other is an ordinary syringe, of good con-
struction, to which the valve box is screwed when in use.

The valve box is a cylinder of metal, containing ovoidal
or egg shaped cavities, equally distant from the centre of the
cylinder; at this point a pipe enters, which, when screwed
on to the syringe, opens a communication between its cavity
and these two cavities in the valve box. Near each end of
the cylinder, a short and slightly conical tube projects late-
rally, to which a flexible tube is to be fastened, and which
causes a communication between the flexible tube and the
cavity in the valve box. Each of these cavities contain a
bullet accurately turned, so as to fit the orifices of the tubes
entering into it, and acting as a valve. It will be seen by re-
ference to the accompanying cut (which is a section of the
valve box) that if the valve box be held vertically, and the
syringe screwed on to it, the bullet in the upper cavity will
fall upon the orifice of the tube leading externally. If the
lower tube be now immersed in water, and the piston of the
syringe be drawn out, it will be evident that the body of the
syringe will be filled with water from the lower tube. If
now the piston be pressed home, the water will pass out of
the tube of the upper cavity; the bullet in the lower cavity
preventing its escape there, just as the bullet in the upper one
prevented the entrance of the air before. It will then always
pump water, or any other fluid, from the lower tube to the
upper.

If the position of the valve box be now reversed, and the
end which was above be placed below, the bullets will fall
by their own gravity into the opposite ends of the cavities,
and the instrument will act as it did before, viz. pumping
from the lower orifice to the upper, although the relative po-
sition of the tubes has been reversed.

To use this instrument, the valve box must be held in
nearly a vertical direction. A long flexible tube being passed

into the stomach, is attached to one of the short conical tubes, say the upper, and a short tube leading to a basin is then fastened to the lower one. The basin being filled with warm water, and the syringe put in action, the water will pass into the stomach and dilute the poison. When enough has passed in, the syringe is to be turned in the hand, so as to bring the tube down which was before above, without taking off the flexible tubes, or changing them in any way, and the syringe again put into action. The water will be pumped out of the stomach bringing the poison along with it.

The following are the chief advantages of this instrument. It is perfectly simple in its construction, and not liable to get out of order.

The directions for its use are easily understood, and as easily remembered.

After the flexible tubes are once adjusted, no alteration is required until the operation is finished.

When the instrument is once put in action, gallons of water may in a few minutes be passed through the stomach, thus washing away every trace of poison, and saving many a valuable life.

Explanation of the cuts.

Fig. 1.
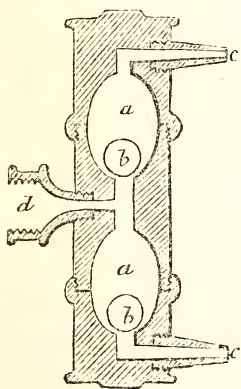
Fig. 1, section of valve box.
  a a, cavities for the bullets.
  b b, bullet valves.
  c c, tubes, to which are attached the pipes.
  d, female screw to attach it to the syringe.

Fig. 2.
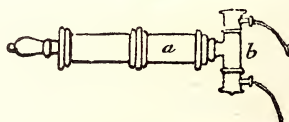
Fig. 2, the entire instrument.
  a, the syringe.
  b, the valve box.

Journal of the Franklin Institute.

Miscellany.

Mercurial Ointment.—So much has been written on mercurial ointment that it might appear almost impossible to say any thing interesting with regard to it. Nevertheless, whilst acknowledging the efficacy of some of the methods devised to extinguish the mercury, especially those recommended by Messrs. Fee and Hernandez, are we not obliged to confess, that no plan has hitherto been devised which attains the desired end without a great waste of time. The following plan is therefore superior to any other, as the operation requires but an hour and a half:—

Pure mercury, - - - - -	750 grammes
Fresh lard, - - - - - -	625 do.
White wax, - - - - - -	125 do.

The lard and the wax are to be melted together; after the mixture has become cold, a third of it is to be triturated with the mercury in a large unpolished stone mortar, with a wooden pestle. Three minutes of brisk trituration, so completely divides the mercury, that at a little distance the naked eye cannot perceive the globules, and the mass has become of a dark gray colour. The trituration is to be continued without intermission for half an hour, when the second third of the excipient is to be added, and after another half hour's labour the remaining third is to be incorporated with the mass, and the trituration continued for half an hour more. This ointment is of good consistence and colour, and at the end of two months, there is no sign of rancidity.

In imitation of the Pharmacopœias of Ferrara, Hanover, the United States &c. which order suet as a constituent of mercurial ointment, we have had recourse to this article in its preparation, but have found that even when used in various proportions, the results were far from satisfactory, eight hours of unremitted trituration being necessary to extinguish the mercury.

The only advantage that is gained by the addition of the suet, is in the consistence of the ointment, as the oxigenating action of the air on fatty bodies is in an inverse ratio to their density. But this is all that is gained; whilst by the substitution of wax we obtain an ointment of good consistence, which requires but a short time in its preparation.

Emile Mouchon.—*Journ. de Chim. Med.*

Preparation of Formic Acid.—One part of sugar is to be dissolved in two parts of water; this solution is to be placed in a copper still, with three parts of pulverized peroxide of manganese, and the mixture heated to 140° F.; when three parts of concentrated sulphuric acid, diluted

with an equal portion of water, are to be gradually added. After the addition of the first third of the acid, a brisk effervescence is produced, hence a large still must be made use of; the head is then to be fixed and united to the worm; when the effervescence has subsided, the remainder of the acid is to be introduced, and the whole distilled to dryness. The acid produced is to be neutralised with chalk. By evaporating it in a retort furnished with a recipient, an ethereal substance is obtained in union with the water, from which it can be separated by distilling over chloride of lime. One pound of sugar affords sufficient formic acid to saturate five or six ounces of carbonate of lime. The residue is a sulphate of manganese, artificial malic acid, and a sort of extractive matter. The sulphate of manganese may be used in dyeing, instead of iron, to deoxidize indigo.

To obtain concentrated formic acid or formic ether, the product spoken of above is to be saturated with carbonate of soda, and the solution evaporated to dryness; seven parts of this dry powder is to be distilled either with a mixture of ten parts of concentrated sulphuric acid diluted with four parts of water, or with ten parts of acid and six of pure alcohol. The formic ether which is formed in the latter case, is to be agitated with a little calcined magnesia, if it be acid, and with a little water to remove the alcohol, and then dried by means of chloride of lime. By contact with water, formic ether is decomposed into formic acid and alcohol; mixed with diluted alcohol, in the proportion of one part to three, it can be preserved unaltered.

Salicine appears to furnish a greater proportion of formic acid than any other vegetable substance, if the above process be used.

Formic ether has an oleaginous appearance, and has the smell of a mixture of cinnamon and bitter almonds.

The reduction of the perfect metals by formic acid, is almost instantaneous; if the solution be heated nearly to boiling and an alkaline formiate added, the metal is precipitated in a very fine powder.

This property of formic acid of thus rapidly acting on the perfect metals, and its transformation into carbonic acid, distinguishes it from acetic acid. *J. W. Dobereiner.—Journ. de Pharm.*

Santonine.—Santonine is in brilliant, colourless prisms, without taste or smell; when exposed to the rays of the sun it becomes yellow; it is soluble in alcohol, and its solution, which is at first yellow, soon loses its colour and furnishes the santonine as at first.

When it is heated in a platina crucible it melts, and volatilises without being decomposed. The diluted acids have little action upon it; and although it is not acid, it forms real salts with alkaline and other bases, which salts are crystallizable, as those of lime, barytes and lead. These combinations take place with very remarkable phenomena. When a mixture of quicklime, water, santonine and alcohol is heated, the fluid at first

assumes a beautiful red colour; on cooling, the calcareous salt crystallizes in needles of a silky appearance, losing its colour from above downwards and at last becomes perfectly white. To purify this salt, it is to be dissolved in warm water, and the excess of lime precipitated by a current of carbonic acid gas. The calcareous combination is not decomposed by the carbonic acid, whilst that of lead is destroyed by mere exposure to the air.

The red colour is also produced when santonine is heated with barytes, ammonia, strontian, soda or potash, but only if alcohol be added; otherwise although the combinations are perfectly formed, they remain of a pure white.

When santonine, changed to a yellow by the effect of the sun's rays, is used in making these basic salts, the products are as white as if white santonine be used, but during the evaporation a yellow colour is observable which disappears on cooling like the red tint spoken of above.

M. Liebig has not yet determined the atomic weight of the calcareous combination of santonine, but an analysis of it has furnished him with the following results :—

Carbon, - - - - -	70.509
Hydrogen, - - - -	7.466
Oxygen, - - - - -	22.025

100.000

Santonine may be obtained by subjecting semencine (semen contra) to the action of hydrated quicklime and alcohol; the alcoholic tincture, when three-fourths evaporated, is to be filtered to separate the resin, and heated with hot concentrated acetic acid, from which the santonine will crystallize on cooling.

It is to be purified by boiling it several times with alcohol and animal charcoal. The semencine which has been deprived of its essential oil, furnishes as much santonine as before. A pound of semencine afforded me two drachms to two drachms and a half of pure santonine. Physicians have recognised powerful vermifuge properties in this substance, in doses of three or four grains twice a day; in large doses, it occasions pain in the stomach, and eructations having a decided taste of semencine.

M. Merck.—Journ. de Pharm.

Active principle of Sarsaparilla.—According to M. Batka, the active principle of sarsaparilla is a peculiar acid, to which he gives the name of parillinic acid, and which is endowed with the following properties :— In the state of a hydrate, it resembles fish scales; when melted, it has the aspect of a resin; by fusion, it acquires a brownish colour; if the temperature be increased, it exhales a peculiarly pungent smell, and becomes carbonised; the charcoal, when burnt, leaves no residue. This acid reddens litmus paper; it is dissolved by alcohol, from which it se-

parates in a crystalline form by evaporation; it is very slightly soluble in cold water; but more so in hot water to which it communicates the property of frothing.

Chloride of lime, the mineral acids, and more especially the hydrochloric, precipitate it in gelatinous flakes, it having in this respect some affinity to pectic acid; but the latter, when treated with nitric acid is converted into oxalic acid, whilst the parillinic acid dissolves without alteration, and may be obtained by evaporation. The parillinic acid unites with the alkalies, and forms soluble but uncrystallizable combinations with them; all these salts impart to water the property of frothing, and of becoming covered with a scum on agitation. Mr. Batka states that the frothing principle discovered by M. Thubeuf in sarsaparilla, is the parillinate of potash.

The author also promises to make known, in a short time, the elementary composition of parillinic acid, and its capacity for saturation.

To obtain this acid, Mr. Batka takes the extract of sarsaparilla obtained by absolute alcohol; he heats this extract with boiling water which dissolves the parillinic acid, evaporates to dryness, takes up the residue with hydrochloric acid; the parillinic acid now separates in flocculæ, which are to be washed and dried.

According to the analysis of M. Batka, sarsaparilla is composed of— 1. A crystalline substance, (parillinic acid.) 2. A crystalline colouring matter. 3. An essential oil. 4. Gum. 5. Bassorine. 6. Fecula. 7. Albumine. 8. Extractive matter. 9. Gluten and glaiadine. 10. Cellular and fibrous tissue. 11. Pectic acid. 12. Acetic acid. 13. Salts, viz. chloride of lime, potassium, magnesium, carbonate of lime, oxide of iron and alumine.   *Journ. de Pharm.*

Improved method of administering Epsom Salts.—Dr. James Henry, of Dublin, recommends the following formula for the administration of sulphate of magnesia, and states that in this form it is an agreeable, safe and efficacious purgative. Saturate cold water with the salt, filter through paper, and to every seven ounces of the solution add one ounce of the dilute sulphuric acid of the Dublin or Edinburgh pharmacopœias. The dose is a table spoonful in a wine glass of water. This dose contains two drachms of the sulphate of magnesia and half a drachm of the acid.

Edinburgh Med. and Surg. Journ.

Rotatory motion of Camphor.—Mr. Matteuci has satisfied himself that the cause of the rotatory motion of camphor when placed on water is owing to the evaporation of the camphor and its solution in the fluid.— When a small piece of lighted charcoal, or a heated metallic wire properly suspended, is placed on the same liquid, a rotation is also induced, owing in these cases to the development of steam. When a fragment of camphor is used of such a size as to rotate very slowly, and the vessel

containing it is placed under the receiver of an air pump, the motion becomes increased in proportion as a vacuum is produced. All the volatile bodies produce the same phenomenon, as do also fixed bodies impregnated with a volatile liquid. *Journ. de Pharm.*

Indian Ink.—M. S. Julien states that the idea entertained by many persons that this pigment was made from the black fluid furnished by the Sepia, is erroneous. It is prepared from lamp black, and its quality depends on that of the black used; this is formed into a paste with an animal glue. The lamp black is prepared either by the combustion of the oil of *tong,* (*Bignonia tomentosa,*) or from that of the *song,* (*Pinus sylvestris.*) The oil is burnt in lamps surmounted with a metal cover, from which the black is detached with a feather. The black from the *song* is made on a large scale in chambers furnished with partitions, in which it deposits. The finest black is that found in the most distant partitions. Fine ink is made with the first of these preparations, and that for common use from the latter. That manufactured at Nankin is the most esteemed. Ginger juice mixed with the water used for dissolving the ink prevents it from spreading when applied to silk &c. The juice of the *fan-tsiao,* (*Piper nigrum,*) prevents it from congealing. That of the *sung-ken,* (a species of pine,) prevents the paper from absorbing it. The ink made into a thick paste with water, promptly alleviates the pain of a burn. *Ibid.*

Opium.—Mr. Boswell, assistant surgeon at Penang, observes that having had occasion to make a quantity of tinct. opii, he felt at a loss what to do with the residuum, when on reference to Paris' Pharmacologia, (Opium. note,) he found it stated that Mr. Haden had macerated the dregs in a solution of tartaric acid, and found the product as strong and even superior to the tincture, inasmuch as it was devoid of either stimulating or binding qualities. Mr. Boswell made his solution by adding two-thirds the quantity of solution of tartaric acid as had previously been obtained of tincture; the mixture was frequently shaken, left for a month and then filtered. The dose he gave is from gtts 50 to ʒj.

Mr. Twining of Calcutta says in confirmation of the good effects &c. of this preparation, that he has used twenty-one pints of a solution made by dissolving ʒxxi. of tartaric acid in twenty-one pints of water, which was mixed with the dregs left after making sixty-three pints of laudanum. *Lond.* These dregs were left on the filter for fourteen days, and the solution of tartaric acid then added to them, the mixture stirred daily for a couple of weeks, and then strained. The medicine prepared in this way is about as high coloured as equal parts of claret and water, it is transparent, but a mould forms on the top of it in ten days.

Trans. Med. & Phys. Soc. Calcutta.

Nitric Acid.—M. Braconnot thinks that the fact observed by M. Pelouze of the action or want of action of concentrated nitric acid, when concentrated or mixed with alcohol, on various carbonates, may be explained by the solubility or insolubility of the corresponding nitrates in these fluids. Thus he has found that concentrated nitric acid, whether cold or hot, does not act on marble, carbonate of barytes, fused carbonate of soda, nor on tin, iron, lead or silver. Now, the nitrates or the oxides which result from the action of the diluted acid on these bodies, are insoluble or nearly so, in nitric acid; on the contrary, copper, zinc, mercury and bismuth, whose nitrates are soluble in the concentrated acid, are rapidly attacked by this agent.   *Journ. de Pharm.*

New Vegetable Principle.—The same chemist states that the action of concentrated nitric acid on organic substances, produces results very different from those obtained with the diluted acid. Thus, potatoe starch, when mixed with concentrated nitric acid, is rapidly transformed into a transparent mucilage, as when the diluted acid is used, but this mucilaginous solution, instead of being soluble in water, is coagulated by it into a whitish cheese-like mass, which represents, on being dried, the weight of the fecula employed; this new substance is softened by boiling water, but is not dissolved; it does not redden litmus paper. Tincture of iodine produces a yellow combination with it. The acids, in general, dissolve it without alteration, for water separates it from most of these solutions. Acetic acid takes up so much of this substance as to assume the consistence of a thick mucilage. This acid mucilage, when applied to paper, linen, or any other body, gives a coat of brilliant varnish which perfectly resists the action of water. Ammonia has no action on it; caustic potash attacks it very slowly, as does also boiling alcohol. This substance, which appears to approach lignine, may be called *Xyloidine.* Sawdust, cotton, flax, gum tragacanth, gum Arabic, inuline and saponine, when heated with concentrated nitric acid are also transformed into it. Cane sugar, mannite and sugar of milk do not furnish it, but are changed into a very bitter substance.   *Ibid.*

Malic Acid.—M. Liebig gives the following method of preparing this acid. To the vegetable juice containing it, is to be added nitrate of lead. The precipitate which is formed is converted after a certain time into crystalline groups, surrounded with a mucilaginous and flocculent matter, which is to be removed by washings and decantation; the malate is to be boiled with diluted sulphuric acid till it loses its granular form. To the mass which forms a homogenous paste a slight excess of sulphuret of barytes is to be added, the liquid is to be filtered, saturated with carbonate of barytes, and boiled. By this operation, there is a precipitation of citrate and tartrate of barytes; all that now remains to do, is to separate

the barytes by means of weak sulphuric acid. Malic acid is isomeric with the citric ; its formula is C 4. H 4. O 4, or

Carbon	41.47
Hydrogen	3.51
Oxygen	55.02

Ibid.

Raspberry Syrup.—M. Blondeau states that the following is the best mode of making this syrup. Crush the raspberries and press them through a hair sieve, and let the juice stand to ferment from eight to fifteen hours, according to the atmospheric temperature. The juice separates itself into two portions, the upper formed of a thick scum or crust, and the lower clear; this is to be strained, and the syrup made with the usual proportion of sugar. When thus prepared, raspberry syrup never jellies, to avoid all chance of this, if the fermentation should not have gone far enough, the syrup should stand till it is perfectly cool. *Ibid.*

New Balsam of Tolu.—M. Bonastre presented to the School of Pharmacy of Paris a new balsam of Tolu from Columbia. This balsam was extremely soft, and although quite recent, contained a great quantity of free benzoic acid. It, however, did not afford, on distillation, as large a proportion of essential oil as might have been expected. This latter was fluid and very balsamic. One part was lighter than water, whilst another remained attached to the sides of the recipient. *Ibid.*

Creosote.—This remarkable product, discovered by Dr. Reichenbach, and which appears destined by its extraordinary effects on the animal economy, to be of important service in medicine, ought to attract the attention of chemists and physicians. Many persons have attempted to prepare it, but without success. Messrs. Billard, pharmaceutist, at Paris, and Oliver, jr., have, however, announced that they have been enabled to procure it in large quantities by the use of a peculiar apparatus. They also state that their preparation is entirely free from the new substance of such *horrible emetic properties*, spoken of by the discoverer, and the presence of which might be productive of so much danger.

Ibid.

Buxine.—M. Couerbe states that he has succeeded in crystallizing buxine, which M. Fauré, of Bordeaux, obtained only in a pulverulent state. The plan pursued by M. Couerbe consists in adding nitric acid to the sulphate of buxine; this acid removes the resin which renders the sulphate impure. A sulphate is thus obtained from which the buxine, in a pure state can be precipitated. *Ibid.*

Vinegar.—M. Chevallier has announced that he has discovered a very simple method of ascertaining the presence of sulphuric acid when added

to vinegar to increase its strength; this consists in evaporating the vinegar in a porcelain capsule; the water and acetic acid are the first volatilized, and the sulphuric acid then shows itself in the form of very dense fumes which are readily recognized. *Ibid.*

Pomatum for preventing the hair from falling out.—M. Aubergier recommends the following preparation for that purpose. ℞. prepared beef marrow ℥vj., oil of sweet almonds ℥ij., red Peruvian bark ℥j. The powdered bark is to be first moistened with a small quantity of the oil of almonds, and then the remainder added and well incorporated; the marrow is to be melted at a moderate temperature and gradully poured into the above mixture, and the whole triturated till cold.

Bull. de Therapeut.

Formulæ for Preparations of Hydriodate of Iron.—M. Pierquin, who has successfully employed the hydriodate of iron in amenorrhœa and leucorrhœa, has published in a recent No. of the *Bull. Gen. et Therap.* the following formulæ:

1*st. For pastilles.*

℞. Hydrod. ferri, ℥j.
Pulv. croc. sativ. ℥iv.
Sacch. alb. ℥viij.
M. fit. 240 pastilles.

Eight or ten grains to be given daily, and the dose gradually increased.

2*d. Tincture.*

℞. Hydrod. ferri, ℥ij.
Alcohol, aq. puræ. āā. ℥ij. M.

A tea-spoonful night and morning for an adult.

3*d. Enemata, injections and lotions.*

℞. Hydrod. ferri, ℥iv.
Aq. puræ. lb.ij. M.

Ointment for the Cure of Porrigo.—M. Biett considers the following as one of the most powerful agents for the cure of porrigo:

℞. Ioduret. sulph. ℈j. to ℥ss.
Axung. ℥j. M.

A drachm is usually employed at each friction. *Ibid.*

JOURNAL

Original Communications.

ART. XXXVIII.—APPLICATION OF NITRIC OXIDE GAS IN EUDIOMETRY;

With a new apparatus for illustrating the condensation produced by it with atmospheric air. By R. Hare, M. D., Professor of Chemistry in the University of Pennsylvania &c.

The property which this substance has of forming with oxygen, nitrous or hyponitrous acid, either of which is absorbed by water, has caused it to be used in eudiometrical operations; but owing to the variable proportions in which the above mentioned compounds are liable to be formed, the results thus obtained have been deemed uncertain, and the directions for using nitric oxide, given by such eminent chemists as Dalton, Gay-Lussac and Thomson, are at variance. Gay-Lussac gave an empirical formula, agreeably to which, one-fourth of the condensation produced by a mixture of equal parts of atmospheric air and nitric oxide, is to be assumed as the atmospheric oxygen present.

As in two volumes of nitric oxide, a volume of nitrogen is combined with one volume of oxygen occupying the same bulk as if merely mingled, to convert the nitric oxide into nitrous acid, which consists of the same quantity of nitrogen with two volumes of oxygen, one volume of oxygen must be requisite. Of course, if nitrous acid be the product, one-third

A

of the deficit produced, would be the quantity of atmospheric oxygen present. This would be too much to correspond with the formula of Gay-Lussac.

Supposing hyponitrous acid produced, only one-half as much oxygen would be required, as is necessary to produce nitrous acid; so that instead of the two volumes of nitric oxide taking one volume, they would take only a half volume. The ratio of $\frac{1}{2}$ in $2.\frac{1}{2}$, is the same as 1 in 5, or one-fifth, which is too little for Gay-Lussac's rule.

The formula recommended by Dr. Thomson, agreeably to which, one-third of the deficit is to be ascribed to oxygen gas, is perfectly consistent with the theory of volumes, and much more consonant to the results of my experiments, than that recommended by the celebrated author of that admirable theory.

The late Professor Dana ingeniously reconciled Gay-Lussac's statement, with the theory of volumes, by suggesting that a half volume of oxygen may take one volume of the nitric oxide, and another half volume of oxygen, two volumes.

$\frac{1}{2}$ oxygen takes 1 oxide and forms nitrous acid.
$\frac{1}{2}$ oxygen	2 oxide and forms hyponitrous acid.

Deficit due to oxygen is as   1   to   3

With the deference due to a chemist so distinguished as the author of the formula in question, I long strove unsuccessfully to verify his statements. Agreeably to a great number of experiments annually repeated during many years with different instruments, it has been found, that when three volumes of nitric oxide are mixed, over water, with five of atmospheric air, nearly the same condensation is effected, as when like quantities of air and of hydrogen are ignited together. In order to demonstrate the truth of this allegation to my numerous class of pupils, I have employed the apparatus represented by the opposite figure. In this the volumes employed are so large as to make the results strikingly evident to the most remote observer.

A hollow glass cylinder thirty inches in height and four inches in diameter, is closed at the top by a brass plate fur-

nished with three cocks, each provided with a gallows screw. By means of a flexible leaden pipe, let one of the cocks be made to communicate with an air pump. Let the other cock, by like means be made to communicate with a pear shaped glass vessel. Let the cylinder, by means of a scale placed on one side of it, be graduated so as to hold eight volumes, any three of which shall be equivalent to the contents of the pear shaped glass vessel. The apparatus being thus prepared and secured, over an extra well of the pneumatic cistern, exhaust the cylinder by means of the air pump, so as to cause the water to rise in it, until by the scale only five volumes of atmospheric air are left, and then open a communication with the pear shaped vessel; the atmospheric contents will pass into the cylinder, and if the graduation be consistent with the premises, the water will sink to the graduation designating the eighth volume. Now let the water by means of the air pump again be raised to the graduation marking the fifth volume, and introduce into the pear shaped vessel as much nitric oxide as it will hold. If under these circumstances, the communication between the pear shaped vessel and the cylinder be reëstablished, the nitric oxide will pass into the cylinder, and combining with the oxygen of the contained air, will produce nitrous acid in red fumes, which the water will begin sensibly to absorb. This absorption is promoted and completed by jets of water, projected vertically through the mingled gasses, by means of the gum elastic bag and the recurved tube to which it is attached.

The five volumes of air, and three of the gas, would make eight were there no absorption; but the actual residue, when the experiment is well performed, is always a little less than five volumes, indicating that a little more than one volume of oxygen is contained in the five volumes of air employed, and that this is condensed by combining with twice its bulk of nitric oxide. The nitrous acid, usually thus called, consists of one atom or volume of nitrogen, with four atoms or two volumes of oxygen. Of course, to convert into this acid nitric oxide consisting of one atom, or one volume of nitrogen, and one volume or two atoms of oxygen uncondensed, one volume or two atoms of oxygen must be added.

ART. XXXIX.—APPARATUS FOR OBTAINING THE NITROGEN FROM ATMOSPHERIC AIR. By R. HARE, Professor of Chemistry in the University of Pennsylvania, &c.

THIS apparatus in its principal parts, differs not from common gasometers. It is provided with a pipe, concentric with the axis of the lower vessel, surmounted by a small copper cup. The pipe in question descends perpendicularly from the level of the brim of the vessel to the bottom; being soldered into a hole in the latter, so that the bore being accessible from without, the copper cup at the upper end may, when necessary, be touched by a hot iron introduced through the pipe.

The inner vessel of the gasometer consists of a bell glass, B, suspended by a cord passing over a wooden gallows, with suitable pulleys. The bell has a perforated neck cemented into a brass cap furnished with a female screw for receiving a cock. To this cock a flexible lead pipe is attached by a gallows screw. Upon the copper cup, a sufficient quantity of phosphorus being placed, and the lower vessel adequately supplied with water, the bell glass is suspended within the lower vessel, as usual with gasometers, and allowed to descend about a third of its depth. Meanwhile the cock of the tube being open, the air is allowed to escape, so that the liquid within and without the bell glass may be on a level. The cock being in the next place closed, and the phosphorus ignited by means of a hot iron, a brilliant combustion ensues. As soon as it declines, the iron meanwhile kept in the fire should be again introduced in order to sustain the combustion till all the oxygen is absorbed.

When the air in the bell glass is completely deoxygenated, which may be known by the yellow colour of the fumes, by depressing the bell in the water, the residual nitrogen may be expelled into any recipient at pleasure, through the flexible pipe attached to the cock for that purpose.
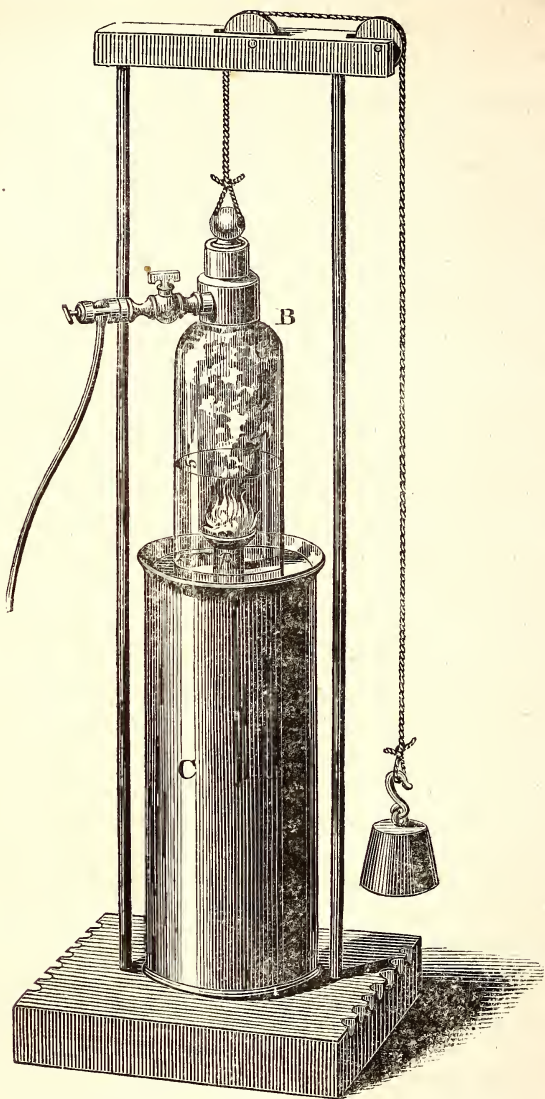
ART. XL.—APPARATUS FOR ILLUSTRATING A PECULIARITY
ATTENDING THE COMBUSTION OF PHOSPHORUS IN NITRIC
OXIDE GAS. By R. HARE, M.D., Professor of Chemistry in the University
of Pennsylvania, &c.

THE apparatus for this experiment is nearly the same as
that used for the separation of nitrogen from atmospheric air.
There are, however, in this, two additional tubes; and the
bell employed is without any cap or cock, and terminating in
a glass knob. The cock at A, to which a gum elastic bag
supplied with oxygen gas is attached, communicates with a
pipe inside, which descends close along the inner side of the
cylindrical copper vessel till it reaches the bottom, then bends
at right angles, and proceeds along the bottom of the vessel
till it reaches the copper pipe in the axis of the vessel. Next
it bends at right angles upwards, and ascends vertically in
close contact with the pipe, till it reaches the copper cup *g*, by
which the pipe is surmounted. It is there so received as to
overhang and direct its orifice *t*, downwards into the cavity of
the copper cap.

Another tube, *u*, proceeds from its junction with a screw and
cock C, on the other side of the vessel, and descends to the
bottom, rising again, like the tube above mentioned, along the
central pipe, till it reaches the brim of the cup, where it ter-
minates without a curvature. After the proper quantity of
phosphorus is placed in the cup, the atmospheric air may
be allowed to escape from the bell glass through the cock C
by sinking it into the water with which the vessel must have
been filled nearly to the brim. The air being expelled, and
a communication made with a self regulating reservoir of
nitric oxide, by means of the flexible leaden tube attached
to the cock for that purpose, the bell may be supplied
sufficiently with this gas, so as to occupy about two-
thirds of its capacity. The cocks being then closed, and
the communication with the reservoir interrupted, a red hot
iron must be introduced through the bore of the central pipe
p, till it touches the cup. For this purpose, it is of course
necessary that the apparatus should be upon a table, with a
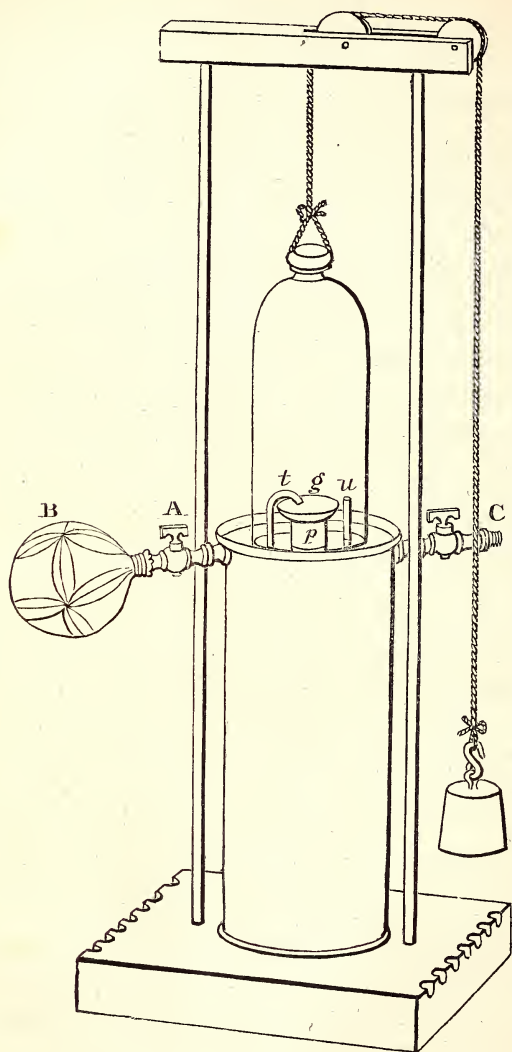
suitable aperture, and of a height sufficient to allow the iron to enter the orifice of the pipe *p*.

Although by the heat of the incandescent iron, the phosphorus will be fused, no combustion will ensue, until, by opening a communication with the gum elastic bag, the entrance is allowed of a small quantity of oxygen gas. But no sooner is this made to take place, than a most brilliant, and almost explosive evolution of heat and light ensues.

ART. XLI.—PHARMACEUTICAL NOTICES.—No. 9.

Carbazotic Acid.—In making this acid for the first time, the operator is more likely to fail than to succeed, partly from the want of precision in most chemical works in describing the process for obtaining it. The carbazotic acid, or as it is named by Berzelius, nitropicric acid, is one of the products of the mutual action of nitric acid and indigo; and is of considerable value to the analytical chemist, as a test of the presence of potassa, forming with it a salt nearly insoluble in cold water. In order to prepare it conveniently, one part of good indigo in small fragments should be gradually dropped into two parts of common nitric acid, and stirred with a glass rod until the violent effervescence subsides. The mixture should be then boiled over a slow fire till it ceases to emit red nitrous fumes. The operation in this stage is materially assisted by the addition of a very small quantity of water, which enables the residuary liquor, on being withdrawn from the fire, to deposit the impure carbazotic acid in the crystalline form. A little more water may afterwards be added, by which a further supply of crystals is obtained; but if no water is added, the nitric acid appears to become so much concentrated as really to destroy the carbazotic acid contained in the mixture. At least I attributed the failure of my first attempt to make it, chiefly to this circumstance. The crystals when once obtained are easily purified to a certain degree, by being boiled in water, and allowed to recrystallize.

B

But in order to obtain them completely pure, the hot solution should be saturated with carbonate of potassa and the salt crystallized—this dissolved in boiling water, and while hot, sulphuric or muriatic acid thrown in, which combines with the potassa, and the carbazotic acid on cooling crystallizes in brilliant, brownish-yellow, feathery plates. In all the mother liquors of these solutions, a quantity remains behind, which of course requires the evaporation of the water, if thought worth while to obtain the whole. The crystals should be washed with very cold water and then dried. This acid, when powdered, has a very pungent effect upon the nose, even in the most minute quantities. It is exceedingly bitter, whence the latter part of the name proposed by Berzelius. It appears to require 128 times its weight of water at 75° Fahr. to dissolve it. As above hinted, its principal use is as a test for potass. One thousand grains of water retained when cold, from the solution made by boiling, about three grains and three-fourths of the carbazotate of potassa, which is equal to about 266 proportionals; Berzelius says 260, and adds:—" The acids which are stronger than nitropicric acid decompose the salt; but on the other hand, this acid dissolved in alcohol and dropped into a solution of a salt whose acid is stronger, such as nitre, produces a nitropicrate (carbazotate) of potassa." Herein consists its great use in analytical chemistry. But as this is not the place for a general detail of its habitudes, and as my only object was to bring into notice some circumstances respecting it which did not appear to have been generally known hitherto among our chemists, I shall take the liberty of referring to Berzelius' *Traite de Chimie*, vol. vi. p. 384 &c., for an interesting account of this acid and its salts.

Ferrocyanate of Potassa as a Test for Copper.—The prevailing practice amongst our druggists, of preparing and keeping their soda water in copper vessels, renders it highly important to be able to ascertain readily and with precision whenever their vessels require to be re-tinned. It is a very common opinion, that if the soda water does not show a blue colour when treated with water of ammonia, it is perfectly

free from copper, and therefore safe. I have been led to inquire a little into this subject, from having known instances of soda water producing nausea, and having an obvious though slight metallic taste, when the presence of copper was not indicated by ammonia in the slightest degree. In one instance, in particular, the vessels had been very recently tinned, so as to make it highly improbable that any of the copper was exposed on the inner surface. On this occasion, after trying the water unsuccessfully with ammonia, and still being convinced from the taste and effects on the stomach, that some metallic substance was present, I made use of a solution of the ferrocyanate of potassa, which at once detected it: and on examining the vessels, (for there were three or four fountains similarly circumstanced,) I found numerous blotches in the tin on the end opposite to the orifice, of about half an inch to one inch in diameter, and exposing the surface of the copper. The great delicacy of this test engaged my attention, and induced me to make trial of it under different circumstances, from which I am able to present the following statement of its delicacy, as compared with that of ammonia :—

One grain of acetate of copper, dissolved in a pint of water, became very obviously blue, when treated with aq. ammoniæ.

Half a grain to a pint—blue colour just perceptible.

One-fourth of a grain to a pint—blue colour not perceptible.

One-fourth of a grain to a pint, treated with ferrocyanate of potassa—red colour very obvious.

One-eighth of a grain to a pint, treated with ferrocyanate of potassa—red colour distinctly perceptible.

One-sixteenth of a grain to a pint, treated with ferrocyanate of potassa—red colour perceptible, but very faint.

When the acetate of copper was dissolved in soda water, the superiority of the ferrocyanate of potassa as a test was still more apparent. We have seen above, that ammonia would not detect the presence of a quarter of a grain in a pint of plain water. Neither would it, when soda water was the medium. But with the ferrocyanate of potassa, the sixteenth

of a grain was perceptible, when water was used, and in soda water the eighth of a grain showed a beautiful delicate light red—the sixteenth, afforded a distinct red—and the thirty-second, a redness just perceptible. From this it appears that the ferrocyanate of potassa should certainly take the place of ammonia in testing soda water for copper, if the druggist is honestly desirous of not subjecting his customers to the pernicious effects of this metal, in a beverage so much resorted to, in the hot weather of our summers.

Liquidambar styraciflua.—From 1000 parts of the balsam of this tree, procured from Louisiana, I obtained about 42 parts of Benzoic acid. The process was that of the Edinburgh college, except that the evaporation ordered by that college was found to be too much to allow the benzoate of soda to remain dissolved. The direction is to evaporate to two pounds ; but four pounds would apparently be better, and no very considerable quantity of acid would be lost by the larger quantity of water. The specimen under examination had been kept perhaps three years, and the operation was conducted under some disadvantages ; so that I think it probable, that by economical manipulation, at least one ounce of benzoic acid might be obtained, on an average, from a pound of this native balsam.   W. H. Jr.

ART. XLII.—TOXICOLOGICAL CONSIDERATIONS ON ARSENIC AND ITS COMPOUNDS. By NAPOLEON CAUNCE.

ARSENIC is one of those metallic substances, which in combination with other bodies forms compounds which possess poisonous properties in the highest degree. The physician has unfortunately but too often occasion to study the deleterious effects of the arsenical poisons on the animal economy. If, on the one hand, a knowledge of the powers of this article, and the facility with which some of its compounds can be procured, often cause them to be used with a criminal intent,

on the other, its inconsiderate and incautious use for the destruction of vermin, has sometimes led to the most disastrous and fatal consequences. Thus the white powder employed by many persons under the name of ratsbane, owes all its poisonous qualities to arsenious acid. Its resemblance to many articles used in domestic economy, as powdered sugar, salt &c., has often been a source of the most lamentable mistakes. The black powder sold under the appellation of flystone, and used for the destruction of these insects, is arsenical cobalt, and is almost as dangerous as the preceding, but fortunately, its appearance serves to distinguish it from any condiment or alimentary substance. It is by no means of rare occurrence to hear of poisoning by the artificial sulphurets of arsenic, as from their use in the arts, they can be procured by individuals without the suspicion attached to the purchase of other preparations of this metal.

The arseniates and arsenites are also possessed of the most virulent powers, but they are seldom found except in the laboratory of the chemist, with the exception of the solution of the arsenite of potash, (Fowler's solution,) which is employed as a therapeutic agent; this form, however, has rarely been resorted to for criminal purposes.

An apothecary is liable to be called upon by the judicial authorities, in a case of poisoning with arsenic, not only to verify any remains of the substance used being an arsenical compound, but also as to the validity of the tests employed in its detection.

Arsenic, unfortunately, differs from most other poisons in one striking particular—its deleterious qualities cannot be neutralized by the action of any antidote or counter poison. All the means hitherto used for this purpose have failed in producing the desired result; thus experience is far from confirming that charcoal will arrest its action, as has been asserted by Dr. Bertrand; and the alkaline sulphurets proposed by M. Renaud do not appear to be endowed with any higher preservative powers. I believe it may be asserted, that the medical profession all agree in opinion, that no antidote for arsenic exists, and that the only mode of treatment

that can be attended with advantageous results, consists in first expelling the poisonous substance by causing vomiting, or by thoroughly cleansing the stomach through the aid of mechanical means, and afterwards by combatting the lesions induced by appropriate remedies.

As before observed, the apothecary may also be cited before a court of justice, to verify the presence of arsenic by chemical experiments. Such researches, it is evident, should be confined to such of the profession as are thoroughly versed in the delicate manipulations so absolutely necessary to success in these delicate and all important investigations. That general chemical knowledge which most physicians possess, is far from being sufficient to enable them to arrive at certain and uncontrovertible conclusions, and it must also be confessed, that few apothecaries can be found to whom such an undertaking could be safely entrusted; hence, the judicial authorities are often obliged to send to great distances for the aid of skilful and experienceed chemists.

If in some cases the existence of arsenic is proclaimed from the most futile experiments; in others it is overlooked or considered as something else, in spite of the most convincing proofs.

It is in a great measure owing to the mode of instruction and graduation of apothecaries, that these evils exist; on the one hand, professors are not sufficiently rigid, and grant a diploma in pharmacy to students who are deficient in chemical instruction; and on the other, whatever may be the merit of the professor of general chemistry, he cannot communicate to his pupils all those little details which nothing but a series of analytical researches, executed under the superintendence of an experienced master, can possibly render them familiar with. This was so strongly felt by the pupils of the School of Pharmacy of Paris, that in a petition to the minister of public instruction, they demanded among other ameliorations, that a chair for toxocological researches should be added to those already existing.

If there are few substances so often employed for criminal purposes as arsenic, there is fortunately no one whose exist-

ence can be more certainly verified. The well marked characters of this metal, and above all, its great volatility, enable us to separate it from the most complicated mixtures. In fact, by a proper use of the proper means, we can in most instances, except where the dóse of the poison has been very small, succeed in demonstrating its presence. If the victim be still alive, the remains of the poisoned food, the fæcal discharges and the matters ejected from the stomach, must form the subjects of our investigations; if he has fallen a victim to the deleterious action of the poison, it may be detected in the matters contained in the stomach and intestines ; if the crime has been committed a long time since, and even the body wholly decomposed, an analysis of the animal detritus which is the result of this putrefaction, may still serve to establish the nature of the poison administered.

According to Mr. Orfila, to whom the science of toxicology, in a great measure, owes its progressive improvement, there is scarcely a limit to the time after death at which a successful examination in cases of poisoning from arsenic can be made. This substance, says he, is indestructible, and by carefully collecting and analyzing those portions of the animal remains which correspond to the supposed situation of the viscera, it may generally be detected.

Whatever deference should be paid to the opinions of so able a chemist, it appears to me, nevertheless, that this should not be received as certain until it has been fully tested by experience; and hitherto such has not been the case. If Mr. Orfila had said this of lead, copper &c., all the compounds of which are stable, no valid objection could perhaps be made to his proposition, but as regards arsenic, the case is widely different. It is well known with what facility hydrogen combines with arsenic, to form arseniated hydrogen ; now, may it not be possible, amidst those complicated reactions which constitute putrefaction, for the hydrogen which is so plentifully disengaged, to carry off a certain portion of the arsenic, and thus baffle any analytical investigation. When we reflect on the formation of phosphuretted hydrogen in graveyards, and on the great analogy that exists between phos-

phorus and arsenic, it is evident that the theory just stated may be based on fact, and it is highly desirable that direct experiments should be made on this important subject.

The different works on toxicology have made known the reagents and manipulations necessary in verifying the existence of arsenic; as the experiments which are instituted with this intention are made in most instances on an exceedingly small portion of arsenic disguised by admixture with alimentary substances, it is necessary to adopt a certain order in these investigations, and the following, which I have seen tested by actual practice, appears to me the best that can be pursued:

If it be possible by any mechanical means to separate some small portions of the substance that is supposed to have caused the poisoning, nothing would be easier than to ascertain whether they were of an arsenical nature, but this, unfortunately, can seldom be accomplished. The minute fragments of the poison, which might otherwise be recognized, are masked by the contents of the viscera; the first object must therefore be to destroy this foreign matter, and to attempt to obtain an arsenical compound in as pure a state as possible.

To separate arsenic from these admixtures, the action of the galvanic pile has been proposed by some chemists, but this means is not very efficacious, and it is much better to recur to the action of reagents, added to which a galvanic apparatus is not always to be obtained. The best test is unquestionably that which not only indicates the smallest portions of the poison, but also furnishes the most insoluble precipitate; this is found in sulphuretted hydrogen, which, according to M. Orfila, will cause a sensible precipitate of sulphuret of arsenic, from a solution containing only the $\frac{1}{100\,000}$ of its weight of arsenious acid.

After having subjected all the solid matters to pressure, and treated them with distilled water, the fluids thus obtained are to be mixed and boiled with nitric acid, which readily decomposes the organic matter; the liquid is now to be saturated with ammonia, and a solution of sulphuretted hydrogen, or of a hydro-sulphuret added to it, with a few drops of any

one of the acids; if the fluid contains arsenious acid, a yellowish precipitate is formed. The solid matters supposed still to contain some of the arsenical poison, are to be treated according to the plan proposed by Rapp, which is as follows.

A certain quantity of nitrate of potash is to be gently heated in a matrass, till it melts, when the animal matter, cut into small pieces, is to be thrown into it. If they contain arsenious acid, it will be transformed into arsenic acid, at the expense of the oxygen of the nitrate, and combine with the potash, thus forming arseniate of potash; the vessel is now to be taken from the fire, and its contents dissolved in distilled water, and filtered. This fluid is then to be treated by a hydro-sulphuret and some drops of hydrochloric acid; the whole is then boiled—if the matter employed contained arsenic, this will be changed by the treatment, first into an arseniate of potash as before mentioned, and finally into sulphuret.

If by either or both these processes a yellow precipitate be obtained, assurance must be had that it is in reality sulphuret of arsenic, to accomplish which it must be subjected to the process of reduction. Several methods have been proposed to attain this result; some authors recommend the precipitate to be calcined with a little potash, but this plan may lead to errors; Berzelius advises the reduction to be made by a current of hydrogen gas; and Liebig is of opinion that the supertartrate of lime is the best agent in affecting this regeneration of the arsenic; the precipitate is to be collected and washed by decantation, for filters should on no account be employed, as it is exceedingly difficult to collect all the precipitate from them. This precipitate, I say, must, according to M. Liebig, be introduced to the bottom of a very narrow glass tube, and a few lines above it, a small piece of tartrate of lime; the tube and its contents are to be heated to redness by means of a spiral lamp. By heating the precipitate, which is supposed to be an arsenical sulphuret, it is volatalized, and the vapours pass through the incandescent salt of lime, where they are decomposed, if they are really arsenical the metallic arsenic is sublimed, and by cautiously forcing

C

it to condense at a given point, the most minute quantities become readily appreciable.*

The appearance of a metallic, volatile substance, and which under the microscope shows the rudiments of tetrahedral crystrals, might be thought sufficient to establish that it was indisputably of an arsenical nature; but as too many precautions cannot be taken to avoid the possibility of any mistake, in a matter compromising the life or liberty of the accused; this metallic crust should be subjected to a series of proofs, which may tend to corroborate or to destroy this opinion.

A part of it, for example, should be again heated in a tube, to discover if it is volatile, and to avoid confounding it with any atoms of charcoal which might have been furnished in the calcination of the tartrate of lime. The fumes of metallic arsenic possess an alliaceous odour which is peculiarly characteristic; hence, a small portion of the crust should be detached and placed on burning coals, to ascertain whether it is endowed with this property, which it should be noted is found in very few other substances. Some atoms of the crust should also be covered with a little ammoniuret of copper and exposed to the action of the air; if it really be arsenic, the blue tint of the reagent will soon be changed to that green colour so characteristic of the arsenite of copper.

As the distinctive characters of arsenious acid are more marked than those of any other of the arsenical compounds, it is highly important to ascertain whether the sublimed and metallic looking substance under consideration can be made to afford this preparation; to do this, it is merely necessary to heat some portions of the crust in a tube, by means of a spirit lamp; the tube is to be open at both ends, and held over the flame in an inclined position; if the crust be arsenic, it will volatilize, become acidified, and finally concrete in white,

* Within a short time past, the judicial authorities in France, consulted the Royal Academy of Medicine, to know whether the white arsenic employed in the manufacture of some kinds of glass, could possibly assume a metallic form in tubes used for the purpose of verifying this metal, and thus lead to the most fatal errors. The Academy appointed a committee on the subject, of which M. Pellatier was chairman, who reported that such an event could not take place. This report was adopted by the Academy.

shining crystals; a solution of these in boiling water, will possess all the properties peculiar to arsenious acid, and may be tested by the different reagents; thus if a small portion of hydro-sulphuric acid be added to it, a yellow colour will make its appearance, and in a few hours a flocculent precipitate will be found, or which may be instantly made to appear by the addition of a few drops of hydrochloric acid; this acid unites to the base in cases where a salt of arsenic is present.   A characteristic property of the above precipitate is its solubility in ammonia.

The hydrosulphates in certain proportions change solutions of arsenious acid to a yellow colour, without inducing any turbidness; but a few drops of any acid which will disengage the sulphuretted hydrogen, will cause the usual yellow precipitate.

The nitrate of silver immediately produces a yellow precipitate, which gradually becomes black on exposure to the light.   This test is very delicate.   A stick of lunar caustic left for a few moments in a solution of arsenious acid, becomes covered with yellow flocculi.

The sulphate of copper gives a flocculent green precipitate in a short time; this precipitate is the arsenite of copper.   If the precipitate does not take place in a few moments, by adding a small quantity of potash, it will at once be formed. This precipitate well washed, and placed in contact with hydrosulphuric acid, gives rise to a brownish yellow colour. The hydro ferrocyanate of potash strikes a vermillion red colour; the nitrate of silver transforms it into an insoluble yellow arsenite of silver, and a soluble nitrate of copper.

The ammoniacal nitrate of copper, when sufficiently diluted, causes a green precipitate on being added to a solution of arsenious acid.

The characters of arsenic acid are not less striking than those of arsenious acid, a trial must therefore be made on another portion of the metallic crust, to ascertain whether this acid cannot be obtained from it.   To do this, it must be treated in a small capsule with minute portions of nitro-muriatic acid, and evaporated to dryness.   After having sa-

turated the excess of acid by the addition of ammonia, the excess of which is also to be driven off by heat, the residue is to be dissolved in distilled water, and the different reagents used to verify arsenic, made use of. If nitrate of silver forms a brick red precipitate—if the salts of copper develope one of a bluish white—if, finally, a drop of a solution of a hydrosulphate and hydrochloric acid, and especially with the aid of heat, causes a yellow precipitate, which, on being collected on a filter, is discoloured by the vapours of ammonia, and again regains its original tint on exposure to the air, it may be considered that the solution certainly contains an arseniate, and that the metallic like crust is really arsenic.

The remarkable property possessed by arsenic of combining with hydrogen to form a gaseous body, is another test that may be made use of with much success, to verify the true nature of the substance under examination. Some atoms of potassium combined with this crust, will produce, if it be arsenic, an alloy which, on contact with water, will give rise to a violent action, and disengage arseniated hydrogen; even if potassium cannot be readily obtained, an analogous play of affinities may be induced by mixing the supposed arsenical body with a small quantity of zinc filings, and treating the mixture with diluted sulphuric acid.

It is not necessary to employ a large quantity of this sublimed product, to enable us to subject it to the above mentioned tests. By experiments, which may almost be termed microscopic, a chemist habituated to delicate manipulations, can obtain the most satisfactory results with the most minute portions of this substance.

From the production of the phenomena above enumerated, an apothecary to whom an examination for arsenic has been confided, could confidently assert that this poison was present in the substances submitted to his inspection. But that there may nothing be left that might throw doubt on his testimony, he should preserve all the precipitates formed. These precipitates, introduced into a glass tube, closed at both ends, will all afford metallic arsenic, and can be again tested. If he should not require the whole of the alimentary and other sub-

stances submitted to his examination, to satisfy himself of the existence of arsenic in them, he should return the portions not used to the proper authorities, that they may undergo the investigation of other competent chemists.*

ART. XLIII.—MEDICO-BOTANICAL NOTICES. No. 3.

Aloes Wood. The article to which this name has been given is almost the only instance in which a diseased state of vegetation furnishes a product of greater value than that of the healthy plant. The above wood, so extensively used in many parts of Asia, for fumigations, and which at one time enjoyed some repute as an anthelmintic, is the result of a diseased action in a large tree found in most of the countries between China and India, from the twenty-fourth degree of north latitude to the equator. It appears to be confined to a small portion of a few trees, of which the rest of the wood is valueless, being totally destitute of the required properties. Even this valuable part of the tree differs much in quality according to soil and climate.

Much confusion exists in the different works on Materia Medica as to this substance, though Loubere in his account of Siam, long since stated that it consisted of " certain diseased portions of a species of large tree, all individuals of which did not furnish it, and in those in which it was found, it was not found in the same part." Mr. Colebrooke, (Ainslie, Mat. Ind. 1480,) however, states that it is not till the tree has long been cut down, and allowed to decay and rot, that the wood acquires its proper fragrance ; to hasten instinct, it is for a time buried under ground ; on being dug up again, so much of it is selected as is of a dark colour and glossy appearance, and found, on trial, to sink in water. According to De Candolle, the tree furnishing this wood is the

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* Two physicians at Gottingen, have, it is declared, lately discovered that the oxhydrat of iron is an infallible antidote against arsenical poison. As the oxhydrat of iron is perfectly innocuous, this discovery is peculiarly interesting.

Aquilaria *secundaria*, whilst Linnæus attributes it to the
A. *ovata*, and Dr. Roxburgh, who states that it was suc-
cessfully cultivated in a botanic garden at Calcutta, calls it the
A. *agallocha.* It appears, however, that aloe wood is also
procured from several other species of trees, thus the Alo-
exylum *agallochum* of Louriero, and the Excæcaria *agallo-
cha* also furnish it.

Benzoin. Mr. Crawford, in his "Indian Archipelago,"
gives the following details with respect to this article: Ben-
zoin, or frankincense, called in commercial language, Benja-
min, is a more general article of commerce than camphor,
though its production be confined to the same islands. Ben-
zoin is divided in commerce, like camphor, into three *sorts*
(head, belly and foot,) according to quality, the comparative
value of which may be expressed by the figures 105,45,18.
Benzoin is valued in proportion to its whiteness, semi-trans-
parency and freedom from adventitious matters. According
to its purity the first sort may be bought at the *emporia* to
which it is brought, at from 50 to 100 dollars per picul,
(133$\frac{1}{3}$ pounds,) the second, from 25 to 45 dollars, and the
worst, from 8 to 10 dollars. According to Linchoten, ben-
zoin, in his time, cost in the market of Sunda Calapa or
Jacatra, from 19$\frac{5}{100}$ to 24$\frac{40}{100}$ dollars the picul. By Niebuhr's
account, the Arabs prefer the worst benzoin of the Indian
islands to the best of their own olibanum or frankincense. In
the London market, the best benzoin is fourteen times more
valuable than olibanum, and even the worst, two and a half
times more valuable. Benzoin usually sells in England at 10
shillings per pound.

Collinsonia *Canadensis.*—Dr. C. Hooker, of New Haven,
who has given a full account of this indigenous plant, states
that it highly deserves the attention of the medical profession
as a diuretic. Dr. A. French, of Milford, Connecticut, appears
to have been the first practitioner who employed it in dis-
eases of the urinary organs, and was very successful with it,
and its efficacy in these cases is corroborated by Dr. Hooker

and Dr. Beers; the latter gentleman gave the powdered root in spoonful doses, but found that he was often obliged to suspend its use from the occurrence of irritation of the stomach. Dr. Hooker is of opinion that the active principle is volatile, and that the most advantageous mode of administration is in infusion, especially if this preparation is made in a close vessel and by a very gentle heat. The powdered root soon loses all its medicinal properties, and even when kept in an entire state cannot be depended upon to produce the same effects as when recently gathered. It appears probable that the best preparation would therefore be the volatile oil. The tincture also might retain the virtues of the recent plant; it is at least worth the trial.

Besides the diuretic properties of the Collinsonia, it has other powers which should not be overlooked. In domestic practice the leaves have attained no little celebrity as an application to wounds and bruises, and in some parts of the country they are considered as an infallible panacea.

HYDRASTIS *Canadensis.*—[The following was found appended to a specimen of H. *Canadensis* in the remains of the herbarium collected by Lewis and Clarke. The original is in the hand writing of Capt. Lewis.]

24th May, 1804. This plant is known in Kentucky, and many other parts of the western country by the name of *yellow root.* It is said to be a sovereign remedy in a disorder common to the inhabitants of country where found, usually termed *sore eyes.* This disease is a violent inflammation of the eyes, frequently attended with high fever, and sometimes terminates in the loss of sight, always gives great pain, and continues for a length of time, in most cases. The preparation and application of this remedy is as follows : Having procured a sufficient quantity of the roots, wash them clean, and suffer them to dry in the shade, break them with the fingers as fine as you can conveniently, put them in a glass vessel, taking care to fill it about two-thirds with the broken root, add rain or river water until the vessel is filled, shake it frequently, and it will be fit for use in the course of six hours; the water must not be decanted, but remaining

with the root is to be frequently applied by wetting a piece of fine linen and touching the eyes gently with it.

This root has a fine aromatic, bitter taste; it is probable that it might be applied internally in many cases with good effect, but I have not learned that any experiments have been as yet made with it in that way.

It makes an excellent *mouth water*, and is an excellent outward application in cases of wounds or local inflammations of any kind. The plant is the growth of rich bottom lands.

East Indian Sarsaparilla.—Some confusion exists as to the plant furnishing the East Indian sarsaparilla. Ainslie (*Mat. Ind.* i. 381) states, that on the Coromandel coast the roots of the PERIPLOCA *Indica* are used under the name of *country sarsaparilla*, whilst on the Malabar coast those of the SMILAX *aspera* are substituted. Dr. A. T. Thomson, who examined specimens of the root imported into London, is of opinion that all he saw was the product of the last mentioned plant or of some closely allied species. As found in commerce, it consists of long, tortuous, cylindrical, rugose roots; the tortical portion resembles cork, and is divided by furrows into moniliform rings; the medullary portion is white. The taste is slightly bitter; but the smell is fragrant and aromatic. On distillation with water, or infusion in alcohol, it gives out a smell analogous to that of peach blossoms. Analysis has shown that it contains a peculiar acid.

MIMOSA *farnesiana.*—The flowers of this plant, which is a native of Louisiana and the West Indies, are remarkably fragrant, and have been exported from Guadaloupe and other French islands to France in considerable quantities, where they are used as medicine, in the form of an infusion, in nervous cordialgia. It also appears that they are much employed to give that peculiar flavour to cordials so much esteemed in those of Martinique. They are also made use of by the manufacturers of perfumery as *bases* for other odours. They impart their smell to water, alcohol and the fatty bodies. It is remarkable, that although furnished by a shrub which con-

tains much tannin, that an infusion of those flowers has no action on solutions of the salts of the peroxide of iron.

Petiveria *fœtida.* This plant, which deserves the attention of the medical botanist, is a native of many of the West India islands. It grows along road sides, and in neglected situations about houses. Every part of it has a strong and unpleasant smell of garlic, and which, as with the latter article, is imparted to the milk of animals that feed upon it. It is in flower most part of the year. According to M. Ricord Madiana, it is in high repute among the Negroes as an antidote to many vegetable and animal poisons, but the principal use made of it by them, is for the cure of drunkenness. For this purpose they infuse a handful of its roots in a bottle of rum, and administer a wine glass of the tincture twice a day. It occasions great nausea, and an extreme disgust to the liquor in which the plant has been infused; this disgust lasts for months. Gomes, (*Obser. Botan.* part i. p. **13**,) also states that it is employed in Brazil in paralysis of the limbs, in these cases the patient is exposed to the steam arising from a decoction of the plant; this brings on a violent perspiration, and has proved highly efficacious. G.

ART. XLIV.—CARRAGEEN OR IRISH MOSS. By L. Feuchtwanger.

Chondrus *crispus*, Lyngbye, Hydropt. Dan. p. 26, t. 4.
Greville, Algæ Brit. p. 129, t. 15.

Spaerococcus *crispus*, Agardh, Sp. Alg. 1. p. 256.

Fucus *crispus*, Lin. Syst. Nat. ii. p. 718. Turn. Hist. Fuc.
p. 216—217.

This moss is common on rocks and stones, along the coast
of Europe; it is also a native of the United States. A very
variable species, but easily recognized, when the eye is ac-
customed to it. The genus Chondrus, belongs to the order
Florideæ of the great natural family of the Algæ. All the
species have a cartilaginous frond, which is flat, without
nerves, dichotomous, dilated at the extremity, and of a livid
reddish colour; the fructification consists of scattered cap-
sules, mostly immersed in the frond, rarely pedicellate;
seeds minute, rounded.*

This moss abounding on the southern and western coasts
of Ireland, has been used by house painters for sizing; it has
likewise been highly esteemed by the inhabitants, as a dietetic
remedy for various diseases; more especially for consumption,
dysentery, ricketts, scrofula and affections of the kidneys and
bladder. Dissolved by being boiled in water, a thick jelly is
produced, more pure and agreeable, than that procured from
any other vegetable, which is found to agree better with the
stomach, than any procured from animal substances. Its
chemical composition appears to me, as far as I have been
able to trace it, of very considerable importance; the jelly
formed by dissolving it in hot water is not only composed of
starch but contains a large proportion of pectic acid, a con-

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* I am indebted to Dr. John Torrey, for the communication of the botanical
description.

siderable quantity of sulphur, and some chlorine and bromine and another acid combined with lime have been discovered; the latter proves to be the oxalic acid.

Neither the fungic nor boletic nor lichenic acids could be detected, and the existence of iodine I have not been able as yet to detect. By extracting the pectic acid with caustic potassa, I found the moss taken up and altogether dissolved, and after treating the gelatinous mass with chloride of calcium, muriatic acid, and applying alcohol to separate the acid, at least 0.6 of this last was the result.

By reducing the moss to coal and dissolving it in water, sulphuretted hydrogen gas was evolved very abundantly; protoxide of iron, subcarbonate of potassa, diluted sulphuric acid and lime water gave copious precipitates.

The chemical characters of this moss are too interesting to be considered as completely determined by the few superficial experiments, undertaken to discover its properties, especially as they were made at a time when I have been continually interrupted by an attention to the duties of my profession, and I consider them as having been undertaken more for the satisfaction of my curiosity, than as tending to a complete and scientific investigation of such an invaluable medical substance as carrageen; but I hope to be able very shortly to develope with more accuracy the entire composition of this singular moss.

The carrageen seems to possess qualities similar to the Iceland moss, which according to Berzelius' last analysis, (a masterpiece in every respect,) consists in 100 parts of 3.6 syrup, 1.9 bitartrate of potassa, tartrate and some phosphate of lime, 3.0 bitter principle, 1.6 green wax, 3.7 gum, 7.0 colouring matter, like extract, 44.6 lichen starch, 36.2 starch-like matter; but carrageen is without bitter principle, contains nothing but soluble matter, and the quantity of nutritious jelley, produced by a small portion of it, gives it the most indisputable preference. It was first introduced by Dr. Reece, who considered it a most important article of food for invalids, and Doctors Sulby, O'Reilly and Sir Henry Halford, speak of the carrageen as the most nutritious article of

diet for invalids they are acquainted with, as well as a light nutritious food for delicate and weakly children. In this respect, it is certainly superior to arrow root, sago &c. being more highly nutritious, easy of digestion, and pleasing to the taste.

Prepared with warm milk and sweetened, it is most particularly recommended as a breakfast for consumptive patients.

Decoction of moss made by boiling half an ounce clear moss in a pint and a half of water or milk until reduced to a pint, is recommended as food for children affected with scrofulous or ricketty diseases, for such as are delicate and weakly, and for infants.

There are some printed directions for the manner of using the carrageen moss for medicinal and culinary purposes, accompanying some imported from England, from which I shall make here an extract.

Directions for using the Moss Medicinally.—Steep a quarter of an ounce of moss in cold water for a few minutes—then withdraw it, (shaking the water out of each sprig) and boil it in a quart of new or unskimmed milk, until it attains the consistence of warm jelly—strain, and sweeten it to the taste with white sugar or honey, or if convenient, with candied Eryngo root; should milk disagree with the stomach, the same portion of water may be used instead. The decoction made with milk is recommended for breakfast for consumptive patients; and with water will be found a most agreeable kind of nourishment, taken at intervals during the day, the flavour being varied with lemon juice or peel, Seville orange juice, cinnamon, or wine of any sort most congenial to the taste.

The decoction in water is also taken for the relief of cough, at any time in the course of the day, when it is troublesome, and it is, for this purpose, simply sweetened with honey.

In dysentery, the decoction either in milk or water, may be administered with equal advantage, and in addition to the sweetening matter, if a tea-spoonful of the tincture of Rhatany be mixed with each cupful of it, tone will thereby be given to the intestines, at the same time that nourishment will be con-

veyed to the system, and irritation prevented—a large tea-cupful of the decoction may be taken three or four times a day.

As a pleasant strengthening food, boiled with milk and strained with the addition of a little sugar, it is unrivalled for infants. Persons take it in this way for breakfast or supper, with the happiest effect, who are sustaining an attack of the cholera.

Culinary Directions.—To make Blanche-Mange :—take half an ounce of moss, and having cleansed it by the process above described, boil it in a pint and half new milk, until it is reduced to a proper thickness to retain its shape ; to be sweet-ened and flavoured with lemon, white wine, or any thing to suit the palate.

To make Orange, Lemon or Savory jellies :—use a similar process, substituting water for milk—add lemon, orange, herbs, &c. according to taste.

To make white soup :—dissolve in water, afterwards add the usual ingredients.

It only remains to state, that the Carrageen or Irish Moss, as a domestic article is peculiarly interesting ; it is the best thickener of milk, broths, &c. makes excellent jellies, and for Blanch-Mange is equal to most expensive ingredients, whilst the cost is comparatively nothing ; it may be used instead of isinglass, jellies, &c. *Am. Journ. Science and Arts.*

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ART. LXV.—EXPERIMENTS TO DETERMINE THE PERIOD WHICH MAY HAVE ELAPSED AFTER THE DISCHARGE OF A PIECE OF FIRE ARMS. By P. H. Boutigny, Pharmaceutist of Evreux, France. Translated for the Journal of the Philadelphia College of Pharmacy. By W. R. Fisher.

The tone of assurance and readiness with which witnesses sometimes speak in relation to the period which may have elapsed, subsequent to the discharge of fire arms, has induced the author to investigate the subject with a view to the attain-ment of certain information in relation to it.

The particular occasion which led to this investigation, was the accusation of a man before the assize court, during the present year, of an attempt at assassination, by means of a

gun. On the trial, a gen d'arme, questioned as to the period
which had elapsed since the discharge of a gun found at the
residence of the accused, replied, that it could not have been
more than four days, because, the dirt about the pan or ham-
mer was black, which would not have been the case if ten or
twelve days had passed; in this latter case the dirt would
have been yellow, said the witness, without hesitation.

Another witness, a skilful armourer, questioned as to the
same fact, replied, that the trace of powder was moist after
three days; but after fifteen, the same trace was dry pulveru-
lent. Nevertheless, this witness had known a case where
the powder was moist after fifteen days; but this he attri-
buted to the action of the atmosphere.

Another question arose, during the discussion, whether the
shot extricated from the wounded man was the same as that
represented to have been sold by a shopkeeper, from whom
the accused was believed to have purchased that destined to
accomplish his murderous intent. Every body seemed satis-
fied on this point; it was declared to be shot No. 2, and that
the identity was perfect.

Finally, an accusing wad, picked upon the spot where the
crime was committed, was presented to augment the proba-
bility of the guilt of the accused. The paper of the wad,
however, did not fit with some pieces of paper found at the
prisoner's house; but on the other hand, it was the same co-
lour, (blue,) of the same appearance, and the same thickness.
The most practised eye, the most exact attention, and the
most minute examination, could not perceive a difference be-
tween this wad and the paper found and seized at the house
of the accused.

All these proofs, or rather appearances, the author thinks
should be insufficient to justify a sentence of death. For
should juries, without better information, or on more certain
grounds, find the accused guilty, the fate of a suspected cri-
minal, whose rights are equally sacred with those of the so-
ciety which accuses him, would be a matter of serious regret.

The first examination made, was as to the paper; and,
says the author, who can say of two pieces of blue paper,

that they are dyed with the same material, or that they are identical? Does not every know that Prussian blue, indigo, turnsol &c., may be used for dyeing, and can any one say, that dyed pieces of paper are identical, without having analysed them? And if upon applying an acid, one should be found reddened and another not, should we not have reason to consider them different, although their physical characters appeared identical? It were useless to comment on the influence which such a result on the reverse, would have on the conviction of jurors.

As regards the identity of the shot, the size of their diameter, should not be sufficient in a court of justice to satisfy us that those taken from a wound are identical with such as may be found at the house of an accused person. To establish such a fact, it is necessary, before proceeding to the analysis of two kinds, to be aware of their usual composition. It is well known that perfectly pure shot is rarely met with, even if it indeed exist; the metal being always alloyed with antimony, arsenic, or even silver; sometimes, too, it contains sulphur or copper. It would seem sufficient to have thus pointed out the numerous differences which exist among different parcels of shot, to render apparent how important the result of chemical analysis may be.

The examination of the weapon itself is thought by the author to be the most important of all the investigations which he proposed to undertake; hence, it was the subject of a most minute examination, and of experiments as varied as they were numerous. By the following routine he attained the solution of this important question.

With the naked eye he first examined the traces of the powder upon the hammer; and next reviewed his examination with the aid of a powerful lens, noting the character of the crusts: after this the crusts were carefully removed, and subjected to analysis in the moist way, with a variety of reagents. In the annexed tabular view, the author gives the result of twenty-one different examinations, made at intervals from one minute after the discharge of the piece to fifty days. An inspection of this table, (A,) shows that arsenious acid

TABLE A.—SYNOPTICAL TABLE of Experiments made on the Lock of a Flint Gun.

Time from the discharge of the piece.	Appearances of Crust, or its Physical Properties.	Appearance of the filtered solution.	Action of Ferrocyanate of Potassa.	Action of Barytic Water.	Action of Acetate of Lead.	The liquid acidulated with Hydro-chloric Acid, action on Paper, moistened with sol. acetate of lead.	Action of Acidulous Arsenic Acid.	Action of Tincture of Galls.	Observations.
1 minute	Blue-black dry	slightly amber coloured	none	Precipitate insoluble in nitric acid.	Chocolate precipitate	Becomes chocolate coloured	None	None	
1 hour	" "	" "	" "	" "	precipitate not so deep	becomes not so deep	"	"	
2 "	" "	" "	" "	" "	precipitate dirty white	almost none	"	"	
4 "	" "	" "	" "	" "	precipitate white	none	"	Scarcely turbid	
8 "	" "	colourless	" "	" "	precipitate very white	"	"	turbid	
12 "	not so deep " "	" "	" "	" "	"	"	"	"	
24 "	" "	" "	" "	" "	"	"	"	"	
2 days	The flint, the pan, & the under part of the cover of the pan, are covered with small crystals: Some specks of oxide of iron are remarked on the crust; the crust is moist.		becomes turbid " "						
3 "	" dry	" "	after 24 hrs. " "	" "	" "	" "	"		
4 "	"	" "	" "	" "	" "	" "	"		
5 "	"	" "	after 24 hrs. liquor evidently blue	" "	" "	" "	"		
6 "	"	" "	after 3 hours the liquor is "	" "	" "	" "	"		
7 "	"	" "	after 6 hours liquor is blue	" "	" "	" "	"		
8 "	"	" "	" "	" "	" "	" "	grey precipitate, after 3 hours the upper part becomes black.		
9 "	"	" "	after 24 hrs. liquor is blue	" "	" "	" "			
10 "	"	" "	" "	" "	" "	" "	"		
15 "	Numerous specks of oxide of iron	" "	blue	" "	" "	" "	scarcely apparent		The sulphate of iron begins to diminish.
20 "	"	" "	none	" "	" "	" "	"		
30 "	"	" "	"	" "	" "	" "	none		
40 "	"	" "	"	" "	" "	" "	"		
50 "	"	" "	"	" "	" "	" "	"		

and barytic water, are useless as tests. The former from there being no indications produced by it; the latter because it constantly shows the presence of sulphuric acid. It remains then, only to show the results of the experiments and their consequences.

Of the physical characters.—No certain intelligence can be gained from the colour of the film, which is in almost every case the same; nor from its hygrometric condition, which must necessarily vary from temperature and locality. It is not so, however, with the red oxide of iron, found on that part of the barrel corresponding to the pan, the presence of which indicates that at least two days have elapsed since the piece was discharged; and its absence, that they have not. The same inferences may be drawn from the presence or absence of crystals in the pan.

Analysis by reagents.—The application of the reagents indicates—1st. The presence of a hydrosulphate. 2d. Sulphuric acid. 3d. The absence of a salt of iron; rather later its presence, then its disappearance, if not complete, at least in a great measure. Upon this salt, then, depends the whole result of the analysis. The results obtained by the physical and chemical characters thus developed, may be divided into four classes, which indicate as many periods.

The first period lasts but for two hours, and is characterized by the bluish black colour of the crust, the absence of the crystals, of the red oxide of iron, of the salt of iron, the slightly amber coloured solution, and the presence of a hydrosulphate.

Second period, is for twenty-four hours, and the colour of the crust is less intense; it is characterized by the turbidness of the solution, the absence of hydrosulphuric acid, of crystals, of red oxide of iron, and by the presence of a few traces of a salt of iron.

Third period, is for six days. It is characterized by the existence of small crystals in the pan. These crystals are elongated, in proportion as the period elapsed since the discharge of the piece has been prolonged. There also exists upon that part of the barrel near the hammer, and particu-

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larly the pan, numerous specks of red oxide of iron. The re-
agents indicate the presence of a salt of iron.

Fourth period, is up to the fiftieth day. It differs from the
third, by there being a much less quantity of the salt of iron,
and a greater of the red oxide.

From all these experiments the conclusion is obvious, that
a piece of fire arms, of which the crust on the pan exhibits
the physical and chemical characters of the first period, has
been discharged at least two hours or more; exhibiting the
characters of the second, at least two hours, and twenty-four
at most; of the third, at least twenty-four hours, and ten
days at most; and finally, of the fourth, at least ten days,
and not more than fifty, have elapsed since the discharge of
the piece. A further inference is, that it is possible to assign
within some hours, and some days after, at what period fire-
arms have been used; and also, that the witness who asserted
that the crust should have been yellowish, was deceived, as
during the period of fifty days that colour was not observed.
[This minute investigation is followed by an account of the
formation and disappearance of the sulphate of iron, which as
it does not particularly relate to this subject, is omitted.] It
has been remarked as a curious fact, that at no period, not
even after the fiftieth day, was there any oxide of iron ad-
hering to the pan, although it exists in considerable quantity
on the barrel. This fact confirms an observation of Mr.
Payen, that the alkalies preserve iron from oxidation; and it
proves also, that potassa is the chief result of the combustion
of gunpowder. The author promises to continue his re-
searches with guns having copper pans, and those with per-
cussion locks.   *Journ. de Chim. Med. Sept.* **1833.**

Agreeably to the promise in his last communication, **M.**
Boutigny (in the February No. 1834, of the Journ. de Chim.
Med.) renews his investigations to determine the period of
the discharge of fire arms. The observations and researches
related in this paper, are directed to those guns whose pans
are made of *copper.* The experiments were pursued gene-
rally after the manner of the former series; rejecting, how-

ever, those reagents, which former trials had proved of no value. Their places were supplied by others, which, says the author, served him no better; adding, with a truly philosophic spirit, " their negative results are no less important, for they aid in simplifying the course of the researches, which are necessary to obtain positive information on the subject of our inquiry."

The reagents employed were the acetate of lead and paper soaked in a solution of that salt, ferrocyanate of potassa, iron wire and ammonia. The effects of these tests are given in the annexed synoptical table, showing the various results obtained, in the course of the experiments which embraced intervals of from one minute to fifty days after the discharge of the gun. A glance at this table (B,) exhibits the inutility of all the tests but two, and they are ferrocyanate of potassa and paper of acetate of lead.

The period of fifty days may be divided into four epochs, which are thus characterized :

First epoch, by the presence of hydrosulphuric acid, and the absence of the salts of copper and of iron, and the red oxide of iron. This epoch embraces from one minute to two hours.

Second epoch, by the absence of hydrosulphuric acid and red oxide of iron, and the presence of a salt of iron and a salt of copper. This epoch embraces from four to twenty-four hours.

Third epoch, like the preceding. More red oxide of iron on the barrel and green oxide of copper on the pan. This period commences at about the second day, and terminates towards the sixth.

The fourth epoch is characterized by the absence of the salts of iron and copper, and the presence of red oxide of iron on the barrel, and green oxide of copper on the pan. It begins about the seventh day, is not well indicated until the tenth, and is prolonged to the fiftieth.

The inferences from these observations are—

That if the crust from a gun pan made of copper possesses the chemical and physical properties indicated as belonging

TABLE B.—SYNOPTICAL TABLE of Experiments made on a Gun Lock with a copper pan.

Time elapsed after the discharge of the piece.	Appearance of the Crust, or Physical Properties.	Appearance of the filter'd solution.	Action of the Acetate of Lead.	Effect of Acetate of Lead paper on the acidulated liquid.	Action of Ferrocyanate of Potassa.	Action of iron wire.	Action of Ammonia.	Observations.
1 minute	Blue-black dry	Almost colourless.	Not so deep white	less	none	none	none	The presence of iron apparent.
1 hour	Grey, dry, some ashy particles are observed.	"	white	still less	"	"	"	
2 "	"	"	"	none	"	"	"	
4 "	Black, not so dry, separating in scales.	"	"	"	slightly blue in about 24 hours	"	"	The presence of iron & copper at the same time
8 "	Black, moist, separating in large scales.	"	very white	"	violet, not clear 24 hours	"	"	
12 "	"	"	"	"	rose colour—not clear immediately. In about 24 hours, a red precipitate liquor, blue	"	"	
24 "	Black, very moist, some green points are seen; the pan is black after washing. Some	"	"	"	"		"	The quantity of iron and copper increasing.
2 days	Same as preceding. Some specks of red oxide of iron on the barrel.	"	"	"	"	"	"	
3 "	Greenish brown, some green points; pan black, numerous specks of red oxide. Id. Specks of red oxide still more numerous.	"	"	"	"	"	"	
4 "	"	"	"	"	Id. Action less decided	"	"	Nothing left but iron.
5 "	"	"	"	"	almost none,—blue in about 24 hours	"	"	
6 "	"	"	"	"	"	"	"	
7 "	Greenish brown; scales sprinkled with white crystalline points; specks of red oxide numerous; the crust adhering to the pan is with green points interspersed.	"	"	"	"	"	"	
8 "	"	"	"	"	"	"	"	
9 "	"	"	"	"	"	"	"	
10 "	"	"	"	"	none	"	"	
15 "	The same characters. It is not so thick, and washing from the pan, which removes any thing mains black.	"	"	"	"	"	"	There is no longer iron or copper.
20 "	"	"	"	"	"	"	"	
30 "	Washing, removes nothing; the pan remaining black.	"	"	"	"	"	"	
40 "	"	"	"	"	"	"	"	
50 "	Id. Two small magnificent blue crystals are seen.	"	"	"	"	"	"	

to the first period, the piece to which it belongs has been discharged within two hours or more.

That the gun has been discharged within four hours at least, and twenty-four or more, if the crust possess the properties incident to the second epoch.

That the gun whose crust exhibits characteristics of the third epoch, has been fired off at least two days, and from six to ten days at most.

And finally, that the gun has been discharged ten days, or rather more, and fifty days at most? if the crust exhibits properties characteristic of the fourth epoch.

Mr. Boutigny adds, that he feels constrained to suggest that this division is merely relative; and recommends that reliance should only be placed on the use of his table, when the object is to render his researches available. He promises, at a future period, to designate the precautions which are necessary to avoid the errors to which a case of this kind is exposed.   *Journ. de Chim. Med.*

ART. XLVI.—ON THE COLOURS TO BE OBTAINED FROM GOLD, THEIR PREPARATION AND USE IN THE ARTS. By M. Golfier Besseyre.

During a great number of experiments to ascertain under what circumstances the finest purple colours could be procured, I collected some new facts, which appear of sufficient importance to attract attention.

Preparation of the purple of Cassius.—Having dissolved three grammes of gold, I evaporated the excess of acid as much as possible, and diluted the solution so as to bring it about to the volume of a litre; consequently each cubic centimetre represented three millimetres of metal; I also dissolved three grammes of tin in pure hydrochloric acid, taking care to have the protochloride as little acid as possible; I then poured in a pint flask about four hundred grammes of distilled water, then having measured twenty cubic centimetres of

the solution of gold in a graduated tube, I plunged this tube to the bottom of the water and emptied it by blowing slowly into it, so as to dispose the chloride of gold in a thin stratum under the water; after this, by means of another graduated tube, I measured six cubic centimetres of the solution of tin, and discharged them rapidly by blowing forcibly into the tube, and directing the jet in an oblique manner against the neck of the flask so as to diminish its force and retard its union with the chloride of gold; immediately afterwards, I corked the flask, and shook it very rapidly; in this way, I obtained a beautiful purple of a homogeneous tint, and which was instantly precipitated. I performed this experiment twenty times, and always with the same results.

Having afterwards doubled the quantity of water, the results were still the same, except that the tint was more on the rose, from the precipitate being finer.

Perceiving that the clear fluid still contained gold, I used a larger proportion of tin 2 to 3, that is, 400 water, 10 of solution of gold and 7 of solution of tin. By operating in the above manner, I now obtained a magnificent purple red of the richest tint, which precipitated in large flakes, the mother water after this contained some gold.

I then tried equal proportions of tin and gold, and obtained a beautiful orange red precipitate, finely divided. I then used in succession the following proportions:

400 water,	10 solution of gold,	20 solution of tin.
"	"	47 "
"	"	50 "
"	"	100 "
"	"	150 "

These five formulæ all afforded a beautiful Corinth grape colour, but no precipitate for two or three days, when one took place of a claret purple colour, which after being well washed, became of a fine crimson purple.

I then thought that the chloruret of tin had the property of keeping the oxide of gold in suspension, and that the chloride had no action.

I recommenced my last experiments, and added nitric acid

to cause the decomposition of the excess of the chloruret. To hasten this decomposition, I heated the mixture, when the yellow tint immediately disappeared, and a beautiful violet purple precipitate took place in large flakes, which seemed to confirm my supposition.

I could not satisfy myself as fully, why the same quantities of water, gold and tin, had in one case afforded me a purple, and in the other a violet; however, I thought that where I hastened its precipitation, the gold had aggregated together in an irregular manner; that is, that there was a formation of purple and of a certain portion of blue, whose mixture made a violet. Some years since having to prepare large quantities of purple, for glass manufacturers, I could always obtain violet tints by adding chloride of sodium, and operating in the old way, that is, by pouring one solution into the other and using a moderate heat; but in using the manipulations above described, the chloride of sodium only retarded the formation of the purple, the product was homogenous, and was only retained longer in suspension, on account of the greater density of the menstruum: thus, with 400 water, 10 solution of gold; 50 concentrated solution chloride of sodium and 7 solution of tin, a colour is obtained which is at first of the colour of beer, owing, it appears to me, to the extreme division of the gold, in ten minutes the colour changes to that of Corinth grapes, and in a few hours, to a beautiful purple, exactly similar to that obtained by a great excess of tin and a spontaneous precipitation.

If the same formula be used, but gradually diminishing the quantity of chloride of sodium, the same results will be obtained more promptly.

I have just said that the violet was a mixture of red and blue, and after numerous trials, I was enabled to obtain this latter colour separately.

I placed in a tube of about the size of a finger, 10 parts of a solution of tin, and added 3 parts of nitric acid, I heated to 50 or 60°; that is, until there was a disengagement of hydrochloric acid, and immediately poured in one part of solution gold; finally I diluted with distilled water, and mixed the

whole by shaking the tube; the product was of an indigo
blue.

If the whole be poured in a capsule, and left undisturbed,
exposed to the action of the air, at the end of a certain time,
the blue will become violet, then purple, and when almost all
the fluid is evaporated, nothing will remain but oxychloruret
of tin and chloride of gold; but if it is wished to preserve the
tint obtained, in all its purity, the product must be poured into
a very high vessel, or what is better, into a large conical
tube closed at its widest end, and washed as speedily as pos-
sible by decantation, till no cloud is produced by the addition
of nitrate of silver.

The three following formulæ give certain results by ope-
rating as above:

10 Tin, 3 Nitric acid, 1 Gold, — Water, Blue precipitate
30 "   10 "   "   3 "   "   Do.   "
30 "   10 "   "   3 "   60 Violet   "

According to the advice of M. Gay Lussac, I examined
whether mixtures of certain proportions of chlorure and of
chloride of tin would not afford blue precipitate by operating
without heat, and was successful in obtaining them; but they
differed much in their chemical composition; the analyses of
them gave me in 100 parts dried at 212°; water 10.0, gold
32.8, peroxide of tin 57.2. It will soon be seen that the other
blue precipitates contained double the quantity of gold.

It is immaterial whether the solutions are more or less
acid, in obtaining the different shades; I operated with solu-
tions as acid as possible, by adding acid to either or both; I
have even used hydrochloric acid instead of water, and have
always remarked that there was no change or alteration of
the tint; but the excess of acid retards the complete forma-
tion and precipitation of the purple, in a greater degree than
the chlorurets of tin and sodium; so much so, that it may
remain in suspension for months, if the liquid be not boiled;
but as the purple is not wholly formed, as long as it is in sus-
pension either in an acid or a chloruret we are always able, by
boiling at different periods, to obtain various shades of co-
lour; nitric acid acts in the same manner, at least if we

operate without the addition of water, employ heat, and add the gold as directed, to obtain a blue.

Chloride of gold is not stable; the gold only appears to be kept in solution by the excess of acid, without which it gradually separates. I possess a bottle filled with a solution prepared with the least possible acid, each cubic centimetre only containing two milligrammes of metal; this bottle had been forgotten since March, 1830; it contains an infinity of very brilliant small spangles of metallic gold, which are invisible by transmitted light, but very evident by reflected.

I obtained similar spangles, mixed with peroxide of tin, under the following circumstances; if a chloruret of tin be prepared with the least possible acid, and left undisturbed till it begins to decompose, there will be no deposit of an oxychloruret as in the common solution; but it will assume a straw colour, and if chloride of gold be added, there will at first be no appearance of a precipitate, but, some days after, there will be a deposit of metallic gold mixed with peroxide of tin.

The following is an analysis of seven different purples:

	Gold.	Tin.	Purple produced.				Quantity of gold.
1. Rose,	100	50	141.5 at 212	130.2 at red heat,			75.46
2. Rose purple,	100	75	201.8 "	184.7 "			81.13
3. Crimson purple,	100	100	279.2 "	254.7 "			88.67
4. Claret purple,	100	100+250 chloride	503.7 "	421.0 "			99.55
5. Violet purple,	100	250	498.2 "	443.5 "			100.00
6. Dull violet,	100	250+nitric acid	522.6 "	460.3 "			100.00
7. Indigo,	100	1000	150.0 "	140.0 "			100.00

The composition of a 100 parts of these purples dried at 212°, was therefore—

1.	7.98 water,	53.32 gold,	38.70 peroxide of tin.
2.	8.47 "	40.20 "	51.33 "
3.	8.77 "	31.75 "	59.48 "
4.	16.41 "	19.76 "	63.83 "
5.	10.97 "	20.07 "	68.96 "
6.	11.92 "	19.13 "	68.95 "
7.	6.66 "	66.66 "	26.68 "

All these purples previously rubbed up with an equal quantity of a very fusible flux, and applied to glass or porcelain, gave: No. 1, 2 and 3 when thickly applied, blues and violets,

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in thin layers, reds; No. 4, 5 and 6, rose, red, and violet red; No. 7, always blues.

Employment of these colours.—The employment of these purples is dependant on a union of particular circumstances, which require notice, as they are connected with my views of the subject.

For painting on porcelain and glass, they are first mixed with a very fusible flux, and these colours are burnt in, in a muffle, at a temperature which does not attain that of the fusion of gold; if it be carried higher, the preservation of the articles requires that they be heated very gradually, and the flux has thus time to form a chemical union with the colour, which forms a compound capable of resisting the highest temperatures.

In these operations, the precautions to be taken consist in avoiding the dust when the colours are rubbed down with water or the volatile oils, and to volatilize these latter so slowly as to leave no trace of charcoal on the painting at the time of the fusion of the flux, as otherwise, there would be a reduction of the oxide of the flux, and subsequently an alloy of the gold and lead, this latter would again become oxidated, and the flux would regain its transparency, but the colour would be destroyed, and the gold would be reduced into microscopic particles.

If the purples have not been washed till long after their preparation, or have been so but imperfectly, they retain too much tin, and the colour after the firing is milky and sometimes opaque; it is then a true enamel, and I even am of opinion, that the appearance of *chatoiement*, which distinguishes the crimson purples, is only this same alteration of the tin in a less degree.

What is a disadvantage to the enameller and painter on porcelain, is of service when these colours are used for water colours, &c. for the more tin they retain when employed in this way, the warmer will be their tone, and they will cover much better, and preserve all the richness of their tints.

When any one of these purples, or gold leaf, or gold dust, is rubbed down with borax, or glass, and then melted, each

of these substances melts as if it were in an isolated state, the borax melts first, and if it contains the purple it holds it in suspension, till the heat has risen to the fusing point of gold, and no colour will be developed, but there will be a revivification of part of the gold. If additional heat be used, the borax, and more especially the glass will be first coloured yellow, then as the heat augments, they will successively become of a fawn yellow, green and blueish green on the one hand, and of an orange yellow, orange red, and purple on the other. These differences depend on the degree and prolongation of the heat applied. For example, at low temperatures, yellow, green and blue colours will soon be obtained, but for purples, the operation must be considerably prolonged, and the temperature raised as much as possible. Hence, these operations, performed in a cupelling furnace, will only give yellows, greens, and blues; in a powerful wind furnace, heated steadily for at least eight hours (for a mass of about 200 grammes) masses will be obtained, which slowly cooled, will be colourless, or of a light yellow, and which, on being again heated to the softening point, will assume a beautiful purple or violet colour.

These results explain fully what it takes in a glass furnace, when a mass of crystal is intended to be coloured, the workman begins by mixing a certain quantity of it in powder with the purple; then makes some experiments in a small furnace, if the mixture assumes an opalescent yellow appearance, he judges that the result will be satisfactory, and places it in the pot; after a first fusion the contents of the crucible are poured into water, when the mass is examined, it will be found of a topaz yellow colour, filled with particles of gold; this operation is repeated four times, and even in certain cases, five or six times, when the mass becomes of a beautiful deep purple, and the particles of gold are no longer perceptible.

It appears to me that it is clearly demonstrated, that the purple which is first added to the mass, is separately fused, and forms the small particles of gold; and as this metal is volatile at high temperatures, in the first fusion a certain portion of the fumes impart a yellow colour to the glass, in the

subsequent operations the quantity of this vapour being aug-
mented, at last gives the purple colour, precisely in the same
manner as takes place when the purple is prepared in the
moist way, in a dense fluid.

I am so fully convinced of this that I believe that a glass
maker will find it to his advantage to employ gold instead of
the purple, as he will be able to obtain purer tints and more
transparent masses, that can afterwards be rendered of a
carmine or crimson colour by adding a little chloride of sil-
ver, or phosphate of lime.

Those who colour crystal by means of gold, are astonished
at the facility with which these masses lose and resume their
colours; hence the results are so capricious that no certain
formulæ have hitherto been given.

As I have studied with the greatest care what passes dur-
ing these operations, I will lay down some general rules.
When the mass is saturated with the vapour of gold, it is
opaque, and most generally of a yellow colour; it is now un-
susceptible of alone giving any other appearance of colour;
it must be remelted with a fresh quantity of colourless crys-
tal; when less saturated, it is translucid, and always presents
very rich violet and blue tints when in thin laminæ; at a
still lower point of saturation, it has a topaz colour, or
else is colourless after it has been purified by having been
exposed to a violent and long continued heat, and then slowly
cooled; when it is again fused, it assumes, if colourless, the
richest wine tint; if yellow, it becomes of a beautiful car-
mine red. If a piece of this colourless glass be taken and
treated till it softens, it will become of a red colour; if it be
kept in a state of fusion for some time, and slowly cooled, it
will again lose its colour, and when fused a second time be-
come of a somewhat violet red; if this experiment be re-
peated, it will assume a violet colour, then a blue, and last
be incapable of manifesting any colour, without it be treated
as at first, that is, by such a heat as to again volatilize the
gold and disperse it through the mass.

I explain these phenomena in the following manner: When
the cooling of the mass has been very slow, the small grains

of gold remain mixed with the crystal, but when the cooling has been sudden, the gold, which was more dilatable than the glass, continues to condense after the latter has become solid. I have coloured glass of all the prismatic colours by employing the purple, chloride or the ammoniuret of gold, or the metal itself, either by using bodies susceptible of yielding oxygen to the gold, or the reverse, and with or without the contact of the air, merely by varying the intensity of the fire and the time the article was exposed to its influence, for the whole appears to depend on the temperature employed.

Very often, when gold is melted by a violent heat, the purple is formed; I have seen large ingots of gold containing but a small proportion of silver, which having been melted with borax alone, were covered with a rich purple powder, and I long since observed the same phenomenon in melting gold of the fineness of $\frac{750}{1000}$, but I then imagined that the copper had some influence in producing the colour.

Finally, I will add, that gold enamel colours are those which are said to blend, as the enamellers call it; this singular property is, however, common to many colouring oxides, and always manifests itself when the enamel is several times passed through the fire. I do not think that it is owing to a reaction with the oxygen of the air, for colourless enamel is not easily altered in this way; but, I presume that there is a different arrangement of the molecules at the surface, which occurring several times, produces a very curious jasper-like appearance; thus with copper very clear greens and reds are produced, which, by long exposure to the air and fire, become like malachite or agate; with silver, the crystal is coloured of a pure topaz, and becomes of an opaque jasper yellow, or even of an opaque white. Pure cobalt and chrome do not blend, or very slightly so; but enamels coloured with gold enjoy this property as much so as those which owe their colour to silver. The mode of avoiding this, is to work as rapidly and at as high a temperature as possible.

It may therefore be assumed, that—

1. In the preparation of hydrated purples with the chlo-

rides of tin, if homogenous products are wished, then the mixture must be made very rapidly. The best plan is that I have described.

2. The state of dilution of the solutions is of no consequence except to a certain point, after which it becomes unimportant

3. The protochloruret of tin alone enjoys the property of reducing gold and transforming it into a purple, the chloride has no influence in producing this result. A certain quantity of the chloruret of tin always reduces a corresponding proportion of the chloride of gold, but if an excess of the former be added, the complete formation of the purple is so retarded, that where a great excess of the salt of tin has been used, we shall have to wait till this excess is spontaneously decomposed before all the purple can be obtained. We may, it is true, hasten this, but then the gold which is not precipitated, becomes aggregated in such a manner that there is a formation of a blue colour, which, becoming mixed with the purple already formed, gives rise to a violet.

4. The acids, chloride of sodium, sulphate of potash, &c. also retard the formation of the purple.

5. Having indicated the delicate operations required to obtain a blue, I mentioned the facts which led me to conclude that all the precipitates of gold, known under the common name of powder of Cassius, are nothing but metallic gold in a divided state, the fineness of which alone, is the cause of the difference of colours, and that according as the division is perfect, so will be the perfection of colour.

Journ. de Pharm.

ART. XLVII.—ON THE PURPLE COLOUR FURNISHED BY THE
MUREX BRANDARIS AND M. TRUNCULUS. By M. Bizio.

THE purple principle of these two murices is a secretion
furnished by a peculiar organ. In its natural state it is co-
lourless, but it assumes a lemon tint when the animal has been
for some time out of the water. It has the consistence and
viscidity of semen, with this difference, that the fluid of the
M. *brandaris* is denser, and at the same time more fluid than
that of the M. *trunculus*. This substance, when exposed to
the air and light becomes first of a lemon colour, then of a
pale green, which gradually increases to that of emerald, then
blue, afterwards reddish, and finally to a beautiful purple.
These changes of colour are more rapid in a strong light,
and the tints are more vivid when the purple principle is
placed on substances which do not absorb humidity, as glass,
earthenware, metals &c., whilst if it is applied to such as ab-
sorb water, as linen &c., the production of these colours is
modified by the action of that fluid, the purple matter drying
by the absorption of the water and by the action of the air,
no change of tint takes place. In this state, if it be placed in
an obscure and damp situation, the succession of colours
again occurs. The author kept cloths, embued with this sub-
stance, for several days without any sensible colouration be-
coming manifest, the purple tint not appearing until the ex-
piration of upwards of two weeks. M. Bizio seems to be of
opinion that this was owing to the drying of the fluid, which
by becoming of a denser consistence prevented the due ac-
tion of the oxygen of the air on its particles. If this were the
fact, why should it only occur with the fluid from the M.
brandaris? for in that from the M. *trunculus* the colour is not
developed until the desiccation has taken place. It is, never-
theless, more rapid in a feeble diffused light, than in the direct
rays of the sun. We would add that the purple tint from the
latter *Murex* is produced in three or four minutes, and that
the changes of colour are so rapid that the gradations
from one to the other can scarcely be appreciated—the

purple of the M. *brandaris*, on the contrary, is not developed for two days.

The smell of the colourless purple principle is analogous to that of the animal; but as soon as the colours begin to appear, the odour somewhat resembles that of carburetted hydrogen, and augments with the intensity of the tint.

The purple colour, in mass, is black and opaque; it somewhat resembles dried blood; its powder is of a vivid red; when recent, its smell somewhat resembles that of assafœtida; it is insoluble in water, alcohol or ether; it undergoes no alteration from cold solutions of ammonia, potash or soda; when boiled in these liquids it imparts a yellowish tinge to them, and they deposit a flocculent substance of a dirty green colour, containing a portion of unacted on purple matter. It appears from this, that these boiling alkaline solutions separate a yellowish matter and a mucous substance, without, however, altering the purple principle.

Sulphuric, hydrochloric or nitric acids, diluted with six parts of water, have no action on the dry purple, even when aided by heat; except that the nitric acid changes the purple colour to a scarlet. The vegetable acids, likewise, exercise no influence on this body. Concentrated sulphuric acid appears at first to destroy it; but in fifteen or sixteen hours, the acid becomes of a yellow colour, and the purple is deposited at the bottom of the vessel, of its full brilliancy.

Ammonia in excess, poured into this acid, causes a precipitate of a mucous substance, and the alkali takes up another of a yellowish colour. Concentrated hydrochloric acid causes no change in the purple principle. Very concentrated nitric acid decolourizes it, and assumes a golden yellow tint, disengaging deutoxide of azote. At the expiration of two days, water added to the solution causes a precipitate of a flocculent substance, of a golden yellow colour. Sulphurous acid has no action on the purple principle; if this latter, however, be plunged in liquid chlorine, or exposed to a current of this gas, it is entirely deprived of colour.

It should be mentioned that there is a difference in the shades of colour afforded by the two species of *Murex* spoken

of; that of the M. *brandaris* is a pure purple, and that of the M. *trunculus* is a purple inclining to blue, answering to the amethystine purple spoken of by Pliny.

M. Bizio has also discovered copper in these murices, and attributes to the presence of this metal the poisonous effects of these and other shell fish.   *Journ. de Chim. Med.*

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ART. XLVIII.—COMPARATIVE EXPERIMENTS ON THE LIQUORICE OF COMMERCE, ON THE REFINED LIQUORICE OF THE SHOPS, AND ON THE EXTRACT OF LIQUORICE OF THE PHARMACO-PŒIAS. By M. ZIER, of Zerbst.

M. ZIER proposed to himself to determine the following points :

1st. Is glycyrrhizine as abundant, and in as great a state of purity, in the liquorice of commerce, as in the extract prepared from the root according to the rules of art?

2d. Does the extract, known as refined liquorice, prepared from the liquorice of commerce, which is known to contain copper, also contain this metal, although the test with iron does not indicate its presence?

In treating the first of these questions, the author admits that the demulcent properties of the various extracts of liquorice are principally owing to the glycyrrhizine, and that the more of this substance in a pure state, contained in an extract, the greater will be its efficacy.   He examined with this view some liquorice purified by himself, and some extract which he prepared from Russian liquorice root, deprived of its epidermis.   He treated both, in a preliminary experiment, with different reagents, as nitric acid, diluted sulphuric and hydrochloric acids, tartaric acid, acetate of lead &c., and found that most of these reagents produced more abundant precipitates in the extract than in the refined liquorice.   But if these precipitates were mainly attributable to the glycyrrhizine, it may be concluded that the first contains a greater proportion of this substance than the second, and that it is in a

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less altered state. This gives rise to another observation. That care should be taken not to mix any substance with a solution of liquorice, which is susceptible of acting on it, if it be wished to administer it in a pure state.

To ascertain with more certainty the relative proportion of glycyrrhizine, M. Zier dissolved half an ounce of the two extracts in equal portions of water, and added diluted sulphuric acid, till there was no longer any formation of a precipitate ; the precipitate from the extract was curdled, that from the refined liquorice was not so. These two precipitates, resulting from a combination of the glycyrrhizine with the sulphuric acid, were washed and dried, the first weighed 72 grains and the second 28, the quantities of glycyrrhizine in these two extracts are therefore as 72 : 28 or 18 : 7.

What is the cause of this difference ? The author attributes it to the fermentation which the fresh juice undergoes in Spain and Calabria, before it is sufficiently concentrated to preserve it from the action of the air. As soon as fermentation begins, a part of the glycyrrhizine is precipitated by the alcohol which forms ; afterwards, if the juice becomes acid there is a complete separation of this substance. As it is of disadvantage to the manufacturer to remove the precipitate when he evaporates the juice, during the whole process the glycyrrhizine is deposited on the sides and bottom of the vessel, and is thus subjected to too great a heat, and becomes more or less charred, and reacts on the juice which it deteriorates.

M. Zier next examined whether the refined liquorice contained copper ; not finding the iron test sufficiently delicate, he resorted to incineration. After having accomplished this, he treated the residue with an excess of nitric acid, filtered the fluid, saturated it with an excess of ammonia, separated it by means of a filter from the precipitate which formed, which he carefully washed, mixed the two liquids together, and then added, according to the process of M. Sarzeau, a little hydro-ferrocyanate of potash in solution, and saturated with diluted nitric acid ; in twenty-four hours, there was a formation of a precipitate of a red colour slightly inclining to blue. This precipitate was dried carefully, and then calcined

in a platina crucible. The residue was dissolved in diluted sulphuric acid; the mixture was heated, and treated with an excess of ammonia. The liquid was then filtered and evaporated to dryness, the product of the evaporation was dissolved in a small quantity of water, acidulated with a little sulphuric acid, and finally a piece of polished iron plunged in the solution; this was speedily covered with a distinct coat of copper. The quantity of this metal was, however, too small for its weight to be determined.

The extract heated in the same way gave a similar result, except that the proportion of copper was still less.

Wishing to ascertain whether the liquorice root also contained copper, he subjected it to the same series of operations, and found that the metal existed in the root in the same proportions as in the extract. He then endeavoured to ascertain the relation that existed between the quantity of copper in the root and its extract, and in the refined liquorice. These experiments demonstrated that this relation is nearly as **30 to 75**, or 2 to 5. This difference, he thinks, arises from the different quantities of copper contained in the roots of the GLY-CYRRHIZA *echinata*, of Russia, and in those of the G. *glabra*, of Spain and Calabria. *Journ. de Pharm.*

ART. XLIX.—REMARKABLE ANALOGY BETWEEN PONDERABLE BODIES, AND CALORIC AND ELECTRICITY. By WILLIAM WEST.

SOME years have elapsed since the attention of chemists was called by Dulong and Petit to the relation between the specific heats and atomic weights of simple bodies. Their experiments and conclusions, though at first called in question, have since been confirmed and extended by others. The relation which they discovered has been variously expressed; it was thus announced by themselves:—" The specific caloric of simple bodies is inversely as their atomic weights." It has since been thus stated:—" A given quantity of heat will elevate the same number of degrees a portion of

every simple substance represented by its atomic weight." A
third mode is :—" The specific heats multiplied by the atomic
weights give a constant quantity." This variety of expression
deserves notice, because it may have tended to obscure, if
not to conceal the analogy between caloric and ponderable
bodies, which it is my purpose to point out.   The analogy in
question is this :—The quantity of caloric separable from, or
combining with bodies, as measured by their power of im-
parting or abstracting heat, is exactly proportional to the
quantity of any ponderable (simple) substance separable from
or combining with the same bodies, as ascertained by weigh-
ing.   Thus it requires, according to the law of Dulong and
Petit, twice as much caloric to elevate the temperature of a
pound of sulphur to 10 degrees, as it does to raise that of a
pound of zinc to the same extent ; and a pound of heated sul-
phur will warm twice as much water, or any third substance,
as a pound of equally hot zinc.   Now, this is exactly what
takes place among ponderable substances.   A certain weight
of sulphur combines with twice as much oxygen, or chlorine,
as the same weight of zinc does, in forming the correspon-
dent compound, and gives up twice as much on entering into
a fresh combination.   If we were to adapt to the ponderable
body oxygen, the phraseology which we are accustomed to
use in regard to caloric, we might say then, and the fact
would be correct, however unusual the expression, that the
" capacity" of sulphur for oxygen is twice as great as that of
zinc.   Again : " The quantities of oxygen combined with by
sulphur and zinc, are in inverse ratio to the weights of the
atoms of those bodies."

Again : a given quantity of oxygen will raise, in the scale
of oxides, portions of zinc and of sulphur represented by their
atomic weights.   Once more : " The weights of oxygen in the
corresponding oxides, multiplied by the atomic weights, give
a constant quantity."   For 16 parts of sulphur combine with
8 oxygen, 16 zinc with 4 oxygen, but $8 \times 16 = 4 \times 32$.   This
ground of analogy between caloric and ponderable bodies is
so obvious, that it would seem as if it must have occurred to
many, yet I have never seen it adverted to.   If it has really

escaped some who might have been expected to notice it, the difference in our modes of expressing facts thus closely corresponding, when the subject is caloric, and when it is a ponderable body, furnishes one reason for the oversight. Another is found in the circumstance that in our experiments and reports of experiments on the relation of bodies to heat, we accustom ourselves to *equal quantities* of the bodies compared, and *variable* quantities of *caloric.*

We are accustomed, on the other hand, to take a fixed quantity of any ponderable substance, and a variable quantity of those whose combinations with it we compare together. But how this analogy has remained without mention, is of minor consequence. I wish to draw attention to its existence, and to a fact exactly corresponding to it in the history of electricity. Mr. Faraday, in his seventh series of researches in that science, says that the quantity of electricity set free during galvanic action, by certain weights of particular bodies, is precisely the same with that which is required to separate them from their combinations with other particles when subject to electrolytic action. He describes one experiment in particular, in which " the chemical action of about 32 parts of zinc, arranged as a voltaic battery, was able to evolve a current of electricity capable of decomposing and transferring the elements of 9 grains of water. Here we may remark the difference in expression, while the fact stated is the same. If for electricity we say iodine, the quantity " set free," or " called into action" during the decomposition of an atom of iodide of zinc, is precisely the same which is required " for forming a new compound on the decomposition of an atom of water." I am aware that the once prevalent doctrine of the materiality of caloric and electricity has given way before the conclusions deduced from certain optical phenomena ; but if the being subject to similar laws of combination with material bodies has no weight in restoring them to a place among the forms of matter, it may assist us in investigating others of their relations.

Lond. and Edin. Phil. Journ.

ART. L.—ON STRYCHNINE. By M. Robiquet.

The difficulties attendant on the extraction of strychnine, and the small quantity to be obtained from the substances containing it, have been the reasons of the high price of this article; but the greater demand for it, since it has been used in India for the destruction of wild animals, has induced some persons to endeavour to find means to diminish its value, and they have had recourse to their favourite plan, which consists in augmenting the weight by foreign admixtures, and they have carried this so far, as to add forty or fifty per cent. of other substances, and especially of magnesia.

Although this fraud is readily to be detected, as a mere calcination will be sufficient to establish the fact, I have thought it proper to notice it in this place. I will also mention another adulteration, which was at first made in good faith, but which has been taken advantage of by less scrupulous individuals; this is the addition of the phosphate of lime which is afforded by the washing of the animal charcoal used to whiten the strychnine. It is well known that these washings are the more efficacious when they are somewhat acidulated, so as to take up that part of the strychnine which adheres to the charcoal; but then the phosphate of lime contained in this article is dissolved, and when the washings are saturated to separate the strychnine, the phosphate is precipitated at the same time, and may thus greatly increase the product.

Finally, the strychnine of commerce is always mixed with a greater or less quantity of brucine, from the circumstance of these two alkaloids always coexisting in the same plants. This adulteration is not very reprehensible, at least as regards the great use of the strychnine, as on the one hand, buyers are aware of it, and on the other, it deteriorates the poisonous quality of the strychnine very slightly. Nevertheless, all these sophistications will be avoided, if no strychnine be purchased except in a crystalline state. But then, as the quantity of the product obtained would be less, its price would be

proportionally increased, though this would not be much greater than at present, from the greater facility with which it is now obtained. I believe that I was the first to accomplish this, and to point out that when pure, it was not reddened by nitric acid. But the presence of very small quantities of brucine are sufficient, as has been shown by M. M. Pelletier and Caventou, to impart this property to it; this test cannot be always used. I habitually employ a method which from long practice enables me to judge approximately of the proportion of brucine in strychnine obtained by precipitation and exempt from inorganic substances. I mix some warm water with it, and add a few drops of acid; the solution being made, I boil and precipitate with ammonia whilst in ebullition. If the strychnine be pure or nearly so, the precipitate is pulverulent and detached. If it contain a marked quantity of brucine, it collects together and adheres to the sides of the vessel; finally, if the proportion be considerable, it forms a tenacious mass resembling a fatty matter. Between these extremes there are some intermediate points which furnish the appreciation of the quantity of brucine.

It may be readily imagined, that in the numerous operations which are performed under the eyes of a practical man, that a great number of interesting details present themselves which he is obliged to neglect, from the attention required to attain the desired results of his manipulation. Hence many escape him, and it would no doubt be the best plan to note them as they occur, which I have done as regards a curious phenomenon which I observed in my experiments on strychnine. Some months since, one of my pupils presented me with a substance that he had extracted from nux vomica, and which he regarded as a new product. It was in long, white, flexible and very silky filaments, of an excessively bitter taste. An alcoholic solution of it was alkaline; nitric acid scarcely reddened it. Placed on burning coals, it was immediately volatilized, leaving no sensible residue; but calcined in a platina crucible, some atoms of lime remained. I dissolved it in a large proportion of alcohol. As soon as the solution began to cool, the liquid become turbid, and let fall a white flaky

precipitate; some hours afterwards, I perceived small transparent polyhedral crystals deposited on the sides of the vessel. These crystals presented all the characters of pure strychnine—the flaky precipitate was lime. It therefore resulted, that a minute quantity of lime is sufficient to completely change the physical characters of strychnine, and this demonstrates with what facility organic substances are susceptible of being modified by the slightest additions, and with what caution we should pronounce on them.

Journ. de Pharm.

ART. LI.—ACTION OF WATER ON CAST IRON PIPES.

[The following extract from a memoir presented by M. Payen to the Philomathic Society of Paris, is possessed of no small interest in the United States, where the employment ef cast iron pipes for the transmission of water is so extended.]

The mayor of Grenoble has lately announced that a remarkable alteration had been observed in the cast iron pipes used for the conveyance of water through that city. The passage of the water in these pipes having become obstructed, they were examined, and found to contain light, green or brown tubercular excresences, composed of impure oxides of iron, adhering at different places on the inside of the tube.

Various analytical researches M. M. Vicat, Crozet, Choper, Correze and Breton, on the gases contained in the water previous to and after its passage through the pipes, and on the nature of the concretions, having resulted in no satisfactory explanation of this phenomenon; the mayor requested that the subject might be taken up by more able chemists.

The result of my experiments on a means of preventing the oxidation of iron by means of a general property I have discovered in alkaline reactions, appears to me to lead to a solution of the problem.

All soluble substances capable of imparting to water an alkaline reaction, prevent the oxidation of iron; as, for example, potash, soda, ammonia and lime, the carbonates of potash, soda and ammonia, the borate of soda &c.

The limit of this power varies in different substances, and in each of them, according as the salts added are below or beyond the limits of this power, either from the proportion of alkaline matter in the fluid being insufficient, or from the presence of another salt counterbalancing its energy; in either case the electric currents are facilitated and oxidation takes place.

But what is very remarkable, is that all points of the superficies of the metal are far from being equally oxidable: the preservative influence is only overcome by an electro-chemical action in those parts where there are solutions of continuity, though these solutions may be imperceptible. Thus the lines of fibrous iron &c., the points where small foreign bodies separate the particles of iron, are often marked by traces of a greenish oxide, whose volume gradually augments. All the rest of the superficies will preserve its metallic appearance for a long time; the points of contact between a bar and the parietes, or of two bars between themselves, evidence the same effect.

Thus, for example, the temperature being at 15° C., a saturated solution of pure potash, mixed with one thousand times its volume of water, will preserve a clean bar of iron, plunged in it, for a long period; but at last, the carbonic acid of the air diminishes the alkaline reaction, and some points of oxidation present themselves, the size of which augment in an irregular manner; but at the same time, the greatest part of the metallic surface preserves its polish even at the end of a year.

Water containing 0.02 of its volume of a saturated solution of carbonate of soda, occasioned conic concretions of oxide of iron on a cylinder of iron; these concretions gradually augmented, and were for a long time of a greenish brown colour, acquiring at last a yellowish colour at their

summit, whilst their base preserved its usual tint. (The fluid was in contact with the atmosphere.)

The same saturated solution, diluted with 59 parts of water, left for a year in an open tube, in contact with clean cylinders of iron, formed concretions which were at first of a greenish colour, and extending in a serpentine direction round the cylinders, and afterwards assumed a rich yellow tint, whilst the rest of the metal, and even that portion of it which projected above the fluid, preserved its metallic lustre.

Under the same circumstances, water containing 0.023 of a saturated solution of carbonate of soda, completely preserved iron from oxidation.

A saturated solution of chloride of sodium, protected from the influence of the air, only developed a few greenish excrescences on the superficies and points of contact of several bars of iron; all the rest of the iron preserved its brilliancy at the end of a year. In another experiment, but under the influence of atmospheric air, the oxidation continued and assumed a rust colour.

A saturated solution of common salt and carbonate of soda, perfectly preserved iron from oxidation, notwithstanding the contact of the air, and the crystallization of a part of each of the two salts. The same solution, diluted with nine volumes of water, gave rise to mammillary concretions of oxide.

Wishing to ascertain what proportions of these ingredients would most accelerate the formation of local concretions of oxide, I have found that a saturated solution of these two salts, diluted with 75 times its volume of river water, and filtered, occasioned in less than a minute the appearance of some points of oxidation of a pale green colour; in ten minutes, they were very marked.

If, according to M. Becquerel, the conductibility be augmented, by applying, by means of a wire, a fragment of well burned charcoal to the iron, the green excrescences appear still more rapidly, and are much more numerous.

In the same weak alkaline solutions, defended from the action of the air, oxidation does not take place. In those con-

taining atmospheric air, the oxidation is arrested, if the access of the external air be cut off.

When this access is uncontrolled, those concretions which are nearest the surface become oxidated in a higher degree, whilst the greenish oxide goes on increasing, and the concretions become much larger. Their figure is sometimes irregularly rounded, sometimes conical, and sometimes variously disposed in serpentine bands.

In four days, iron bars plunged into water which had been digested on powdered marble, showed some points of greenish oxide, and flakes of rust near the surface of the liquid.

It results from the preceding facts, and from some others not detailed—

1st. That all solutions having a feeble alkaline reaction, will, in preserving the rest of the iron, occasion local concretions of oxide at certain points.

2d. That this reaction and its rapidity vary according to the presence and proportion of the air, of different salts, and also according to the solutions of continuity between the parts of the metal.

3d. That acid solutions cause a uniform but less voluminous oxidation.

These concretions, therefore, are to be expected in iron water pipes, which serve for the passage of water which is very slightly saline, and has a feeble alkaline reaction.

At the same time, the state of division of these concretions, permits their ready removal, either by mechanical means, or by a weak acid, which will have but little action on the metal.

Journ. de Chim. Med.

ART. LII.—REMARKS ON THE PLANT WHICH YIELDS THE
CASCARILLA BARK. By DAVID DON, Esq.

THERE is reason to believe that many species of *Croton*
afford a bark partaking more or less of the properties of cas-
carilla, and indeed this opinion is borne out by analogy with
other genera among whose members similar qualities are ge-
nerally found to prevail. It is a curious fact, however, that
the *Croton cascarilla* of Linnæus possesses none of the sensi-
ble properties of cascarilla bark. The late Dr. Wright, whose
knowledge of the medicinal plants of Jamaica was unrivalled,
appears to have been the first to determine this fact, and that
the bark in question was derived from the *Croton eluteria*,
of which a faithful representation will be found in Sloane's
Jamaica, (vol. ii. t. 174. f. 2,) referred incorrectly by Linnæus
to his *Croton glabellum.* The same opinion seems also to
have been entertained by Linnæus himself, for in the first edi-
tion of his *Materia Medica*, the *Cascarilla cortex* is mentioned
as one of the products of *Clutia eluteria*, but he afterwards,
as now appears on very insufficient grounds, altered his opi-
nion in favour of a plant with which he was entirely unac-
quainted, except from the figure in Catesby's Carolina, (vol.
ii. t. 46.) Of this plant, which he named *Clutia cascarilla*, he
had then seen no specimen, and in the *Species Plantarum*,
where it occurs for the first time, he has stamped it with the
usual mark of an obscure species. Of *Clutia eluteria* he had
a sample from which he evidently drew up his description, in
the *Amœnitates Academicæ*, although he confounded with it a
Ceylonese plant, which he had taken up in the *Flora Zeylanica*
from Hermann, and likewise two other totally different spe-
cies, the first figured by Plukenet, which is *Croton micans* of
Swartz, and the second by Seba, (*Thesaurus*, vol. i. t. 35. f.
3.) In the Lambertian Herbarium, there is a specimen from
Curacoa exactly resembling the last-mentioned figure, which
I should be inclined to refer to *Croton nitens* of Swartz. The
specific character, which occurs throughout all Linnæus'

works, of *Clutia*, or rather *Croton eluteria*, appears to refer entirely to the Ceylon plant, whose history is still involved in great obscurity. ·

Dr. Wright considered the Elutheria and Cascarilla barks as the produce of *Croton eluteria*, and this opinion is now pretty generally adopted by pharmaceutical writers; but I am disposed to regard them as derived from two distinct species, and I rather incline to the opinion of Boulduc, Spielman, and others, that the cascarilla bark is a production of the Spanish Main, for it does not appear that it ever was obtained from Jamaica, or even from the Bahama Islands, (from one of which the appellation Eluteria or Eleutheria is derived,) and it is now ascertained, from the recent observations of Messrs. Scheide and Deppe, that a bark, agreeing in every particular with the cascarilla bark of the shops, that is collected extensively in the vicinity of Jalapa, at Actopan, and in the district of Plan del Rio, in the province of Vera Cruz, Mexico, where it is known by the names of Copalche or Quina Blanca. These gentlemen considered the plant at the time to be identical with the *Croton eluteria*, but although closely related, it is nevertheless essentially distinct from that species, differing in its broadly cordate, five-nerved leaves, which are slightly peltate at their insertion, and of a more coriacious texture. In *Croton eluteria* the leaves are ovate-oblong or elliptical, furnished with a solitary midrib, having obliquely transverse ramifications, and the base either obtuse or somewhat attenuated, but neither cordate nor peltate. The inflorescence is racemose, and in other respects nearly similar in both species. The tree grows to the height of twenty-five or thirty feet, is much branched, and clothed with a profusion of broadly cordate leaves, silvery underneath, and numerous clusters of white flowers. The bark is exteriorly of a gray colour, pale brown within, of an even fracture, possessing a strong aromatic flavour, and an agreeable bitter taste, and in other respects accords with the Cascarilla bark of the shops, for I have carefully compared samples of the bark sent by Messieurs Scheide and Deppe with others from the Apothecaries' Hall, and I think there cannot be a question

as to their identity. To the Mexican species I would recommend the application of the name of *Croton cascarilla,* that of *Pseudo-China* given to it by Professor Schlechtendal, in his recent treatise on the subject, being in many respects objectionable, and leaving to the *Croton cascarilla* of Linnæus the more recent epithet of *linearis,* applied to it by Jacquin, being perfectly convinced of the identity of the latter with the Linnæan *Cascarilla,* and that the distinctions hitherto relied on to keep them apart are of too trivial and variable a nature to be entitled to the importance which has been assigned them. The specimen in the Linnæan Herbarium appears to have been communicated by Philip Miller, and belongs to the West India variety, with narrower leaves, and consequently is what Jacquin meant by his *Croton linearis.* The glands at the insertion of the leaf, I observe, vary from two to four, although, in the specific character of *linearis,* they are stated to be uniformly two, and three in *Croton cascarilla.*— *The Edinburgh New Philosophical Journal, April* 1834.

ART. LIII.—ON THE ORIGIN OF AMBERGRIS AND SPERMACETI.
By A. Baudrimont, M. D.

There are numerous opinions as to the origin of ambergris, not one of which will bear the test of a close examination. Without intending to review them, it will, however, be necessary to advert to two of them, that of M. Virey, and that of M. M. Pelletier and Caventou. The first of these distinguished authors has maintained that ambergris was formed of cuttle fish, which, not being properly digested in the intestines of the whale, were changed into a kind of adipocire, analagous to that of dead bodies ; but it is now admitted that adipocire is not a mere transformation of the muscular fibre, but an ammoniacal soap, formed by the fatty substance contained in animal bodies, and by the ammonia which is produced by the decomposition of the azotic substances formed by their organs ; moreover, it is even hypothetical whether

margaric acid is formed or not in the fat. M. Virey has been led to his theory because ambergris sometimes contains the beaks of cuttle fish.

M. M. Pelletier and Caventou are of opinion that ambergris is a calculous concretion of the gall bladder of the whale. These authors found this on the chemical analogy that exists between ambreine and the cholesterine of human biliary calculi; this opinion was given with much reserve, though it is highly plausible. It may be objected: 1st. That cholesterine is met with in other substances than biliary calculi; 2d. It can scarcely be supposed that all spermaceti whales are affected with biliary calculi; 3d. That all the varieties of biliary calculi are inodorous. But without multiplying objections, there is another theory that appears better based on analogy.

Several years since, M. de Blainville, in one of his lectures, said, in speaking of the spermaceti whale, "that it was highly probable that the ambergris found in this animal, was the product of a secretion from cryptæ analogous to those which secrete musk in the *Moschus moschiferus,*to those which furnish civet in the *viverra* and to those which secrete castoreum in the *Castor fiber ;* but this cannot be decided until a zoologist shall be fortunate enough to dissect a spermaceti whale." This interesting remark struck me, and I have since been confirmed in the opinion. In fact, if we compare the physical properties of these four products, they will be found to present the greatest analogies; they are all odorous, and the odour is not widely different; they all soften on the application of heat, and harden again on cooling. As to the composition of these four substances, we cannot avoid being struck with the resemblance that exists between ambriene and the substance A, in the analysis of musk by M. M. Blondeau and Guibourt, although these chemists have compared it to stearine ; but added to this, musk contains cholesterine, and hence, in comparing ambergris to musk and its congeners, there exists quite as many proofs as for the theory of M. M. Pellatier and Caventou. Ambreine also has some analogy to castorine, and according to Bonn, castoreum contains choles-

terine. When civet is treated with alcohol, it affords a solid fatty body, which has been too little studied to be fully understood. The analogy which exists between ambergris, musk, castoreum and civet, is so great that in the elementary treatises on chemistry by Thenard, and on materia medica by Barbier, which have a different aim, and a wholly different classification, these substances are spoken of under the same head.

In admitting that ambergris is a musk like product, we must take for granted that the spermaceti whale has very large follicles, not only from the size of the animal but also from the quantity of ambergris sometimes found. No author has spoken of these follicles, but it may be interesting to see if their existence cannot be deduced from other facts. It has been said that ambergris is a morbid concretion which takes place in the cœcum, and which is sometimes found there in such quantities that a strongly marked prominence is discernible under the abdomen of the animal, and that fishermen are certain of the existence of ambergris before they open a whale. It is evident that it can only be in the direction of the line of gravity that the intestinal tumour will be visible externally, even if the parietes of this part would not entirely prevent such an occurrence; hence it would be under water and invisible. If these tumours have really been observed, they must adhere to the skin, and may therefore be follicles. If this be the case, how is it that they are not found in all spermaceti whales, and that those who are furnished with them are considered to be diseased? This may be readily explained: ancient writers and navigators thought that the spermaceti whale was the male of the common species; those, therefore, which had these tumours, were thought to be diseased. It is by no means uncommon, even now, among the vulgar, to suppose that the spermaceti is the male of the common whale, and the name, perhaps, has tended to confirm this idea.

All authors on materia medica have stated that the spermaceti surrounded the brain and spinal marrow of the animal. This whale, however, like all the Cetacea, has the brain

surrounded by membranes which secrete a serous fluid, and not spermaceti. This rests on the cranium, in a particular tissue, and is covered by the skin. Through this tissue passes the single blow hole. This accumulation of spermaceti is what gives the great size to the head, and is the origin of the specific name of *macrocephalus*, for the cranium itself is not larger than in the common whale.   *Journ. de Pharm.*

ART. LIV.—ACTION OF THE AQUEOUS EXTRACT OF OPIUM ON THE BICHLORIDE OF MERCURY. By M. CAILLIOT.

BEFORE chemistry brought us better acquainted with the nature of organic bodies, it was generally believed, that when a vegetable product affected in any way a metallic salt, that all other vegetable products were endowed with the same property ; thus it was supposed that the aqueous extract of opium, which causes a sudden change in a solution of the bichloride of mercury, could exert no other action on this salt than that which is common to the extracts of indigenous plants, which, as is well known, deprive the per-salts of mercury of a part of their oxygen.

Although this opinion is entertained by some authors of the present day, most physicians are sceptical of the fact, for they well know that the bichloride of mercury does not sensibly lose its medical properties, whether it be administered in combination with the aqueous extract of opium, or in the state of a simple solution in distilled water. It is this practical observation which suggested to me the idea of verifying by experiments the state of the bichloride of mercury, after it has been subjected to the chemical action of the aqueous extract of opium ; for this purpose, I operated on 16 grammes of extract, and 0.4 grammes of the bichloride.

These quantities were such, that if the extract had been of a non alkaline nature, the whole of the salt would have been transformed into a protochloride of mercury. Each substance

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having been separately dissolved in distilled water, and the two solutions mixed together, a brown, flocculent precipitate was instantly formed, which was left undisturbed for fifteen days, to permit the vegetable substance to exert its full action on the metallic body. After this lapse of time, it was successively washed with water and alcohol; being thus freed from any soluble matters, the precipitate was found to have the property of being changed to a black colour by ammonia, and to greenish yellow by diluted hydriodic acid.

The washings, and more especially the first, had a bitter, styptic taste, which resembled those of the salts of mercury and the alkalies of opium; treated with a very small quantity of iodide of potassium, a 0.05 grammes for example, to 32 grammes of fluid, they afforded a large, white precipitate, but slightly soluble in water or alcohol.

As to the fluid in which the precipitate had remained, it had a deep brown colour, and a metallic taste which excited the salivary glands; left undisturbed for six weeks, it gave no traces of protochloride of mercury; it afforded a brown precipitate on a fresh addition of the bichloride of that metal, and iodide of potassium occasioned a precipitate which assumed a reddish colour on the addition of either sulphuric or hydrochloric acid.

These facts, therefore, prove, that when the aqueous extract of opium is made to act on the bichloride of mercury, a portion of this salt is converted into a protochloride, whilst another part unites with the active principles of the opium, with which it forms more or less complex compounds.

Journ. de Pharm.

ART. LV.—SOME EXPERIMENTAL RESEARCHES TO DETERMINE
THE NATURE OF CAPILLARY ATTRACTION.

By John W. Draper.

If we take a couple of leaden bullets, and pare away from
each of them a small shaving with a sharp penknife, so as to
leave a bright, plane, metallic surface, on bringing them into
contact, and gently pressing them together, they will be found
to adhere very strongly—it requires some effort to separate
them. The same takes place where two pieces of plate glass
are used, and this phenomenon sometimes occurs on a large
scale in manufactories of plate glass, where the pieces, after
being dressed, are piled on one another. The attractive
force, acting constantly for a length of time, during which
extensive barometric and thermometric changes occur in the
atmosphere, the effect is to bring the pieces into such close
contact, that they actually become united, and may be cut as
one piece by a diamond.

We may likewise observe round the edge of a glass of
water, that the liquid appears to stand higher wherever it
touches the glass, than it does in the centre of its surface.
From the former experiment, we see that solid bodies, upon
an approximation almost to contact, attract each other ; from
the latter, that the attraction still exists even if one of the
bodies be a liquid ; for this rise of water, is plainly owing to
the existence of an attractive force, between the water and
the glass.

If we take a tube of small diameter, and dip one end of it
into a cistern of water, we see the effect of this attraction in
its most striking point of view. The liquid immediately rises
in the tube, to a height proportionally greater as the tube is
smaller. Glass tubes may be made of such excessive fine-
ness, that their bore shall be much less than the diameter of
a hair. Such tubes are called capillary tubes, and from the
phenomenon taking place in them to the greatest extent, this
attraction has been called capillary, or the phenomena of ca-
pillary tubes.

But, while some liquids thus rise in glass tubes, there are others in which a reverse effect takes place; mercury, or melted lead, or tin, falls. The circumstance of a rise or fall, appears to be dependant on the nature of the tube and liquid as regards each other; thus if a tube be indued with grease, water will not rise in it, but is depressed. For different tubes of different diameters, the elevation or depression of a liquid, is in the inverse ratio of their diameters.

It is not known to whom we are indebted for the discovery of these singular facts, as they were well ascertained before the time of Newton——they are doubtless the result of the labours of some early experimenter. Boyle made experiments on the adhesion of polished marbles, at first attributing it to atmospheric pressure, but afterwards finding out his error, he relinquished that idea. At that time, the explanation given by philosophers of the rise of liquids in capillary tubes, was either founded on a supposition, that the atmospheric pressure *within* the tube was less than *without*, owing to the narrowness of the bore, or that there was a subtile fluid, which, flowing from the bottom to the top of the tubes, in a silent whirlpool, carried the liquids in its vortex; both these hypotheses were rejected by Newton, on considering that, in every case, the amount of rise, ought to be in an inverse ratio of the specific gravity of the liquid. So, whilst philosophers vainly tried to find, in agents exterior and invisible, the true causes of the phenomenon, this very cause existed in the tube they held in their hands, and depended on that kind of attraction designated by the name Attraction at Small Distances. Newton, after several erroneous guesses, came to this conclusion, whilst other philosophers were yet tardy to acknowledge the truth, willing rather to attribute all the phenomena to the unknown pressure of some spiritual fluid, or the vortices of some subtile matter. This was the last refuge of the vortices of Descartes, which after being banished from the celestial regions sought to maintain themselves in those recesses of nature, where attraction, reproduced under another form, disputed the place with them. Succeeding philosophers have seen reason to attribute the whole class of phenomena to the

same cause, and only differ as regards the mechanism by which all the effects are produced. (Haüy.)

With very little exception, nothing has been effected since that time to determine by experiment the true nature of this attraction; and, indeed, I do not see how it was possible to come at the truth, without every aid that science as it now stands, can afford. Capillary attraction having fallen into the hands of mathematicians, several of the most distinguished paid considerable attention to it. Of all these geometers, Clairaut alone came to one conclusion of vital importance, which I shall endeavour to indicate.

It has been already noticed, that whilst water and other liquids rise in tubes of glass, mercury experiences a corresponding depression. At first sight it might appear, that if the rise of water is in consequence of an attraction between the glass and that liquid, the depression of mercury might be attributed to a true repulsion, and this receives some colour from the fact, that liquids which can *wet* solid tubes, rise in them; but if they are unable to *wet* them, they fall. Thus water will wet glass, but quicksilver will not. Clairaut found, however, that both the rise and fall of liquids, are due to attraction, as compared with the adhesion of the fluids. He found, that if the mutual attraction of a solid and fluid, amount to less than half the cohesion of the latter, there will be a depression; if it be equal to half, the liquid will stand level in the tube, and if it surpass the half, the liquid will rise.

As other theories have disappeared before that of Clairaut, it, in its turn, disappeared before that of the Marquis Laplace, and that of Dr. Young. I do not stay now to determine whether we are to consider the bounding meniscus as elastic surfaces, acting by their tension, which was the doctrine of Dr. Young, or whether, with Laplace, we are to attribute the rise or fall of liquids to the attraction of a thin layer of liquid, immediately adjacent to the sides of the tube. The latter, I believe, will be found most agreeable to the general tenor of my experiments.

At a particular time of the year, a phenomenon takes place throughout all the vegetable world,—this is the rise of sap,—

which is immediately connected with the budding, blossoming and flourishing, of trees, plants and flowers. In the months of April and May, if we cut asunder a vine branch, at one blow with a sharp axe, we shall perceive that the wood is nothing more than a vast collection of capillary tubes, from the wounded extremity of each of which, there runs a limpid water. By cutting the stump shorter and shorter down towards the ground, we shall find that it proceeds thence. On the 20th of April, I cut asunder at one blow with an axe, a vine of about one inch and a half in diameter, at about eighteen inches from the ground, and placed a vessel to receive the tears, covering the arrangement with branches, to protect it from the rays of the sun. The thermometer stood at 109.2° Fahr., in the sun, and 80.7° in the shade. The barometer 29.92, and the time of the day twenty minutes before ten in the morning. In the course of eight hours, the barometer had risen .1 inch, and the thermometer having fallen to 76°, the liquid was measured, and seventy ounces were found in the vessel. More would doubtless have been collected, but the extremities of the tubes were covered with a gelatinous matter, which choaked them. This fluid had a vegetable taste. Through a powerful microscope, no animalculæ, or signs of life, could be found. There were, however, a number of semi-opaque bodies, some of a globular, and some of an ellipsoidal form, smaller in diameter than the capillary tubes. In a few days these appeared to have putrified, and then the whole liquid swarmed with life.

This phenomenon, the rise of sap in trees, from its generality and importance, has long been studied. The nearest approach to ascertaining its true nature, was made by Dutrochet, who, relying on a certain galvanic experiment, and aided by the discovery of endosmosis which he had made, to which there will be occasion hereafter to refer, attributed it entirely to the action of electrical currents. The mechanism he designed was erroneous, but he was far in advance of any of his predecessors.

This was the state in which I found capillary attraction ; my attention was first drawn to it during those tiresome mo=

ments of returning health which follow an autumnal fever.—
Perhaps, if there be any merit in these experiments, it may
hereafter be of service to some one to know, that they were
begun in sickness, and in a land of strangers—they were
pursued in all the calamity of family bereavement, and in the
depths of forest, alike unused to music, to poetry, or philoso-
phy. Solitude, if it be conducive to the development of the
intellect, and favourable to the exercise of thought, is like-
wise attended with many evils. Though no disturbance arises
from the intrusion of the frivolous, yet the counsel and assist-
ance of the wise are wanting, and, indeed, those advantages
which are supposed to result from such tranquillity, are, for
the most part, only fictitious appearances, which, like certain
other apparitions, every one can discourse of, but no one can
say he has seen.

My first experiments were made in regard to the rise of
liquids in tubes, but it was soon found that this was too com-
plicated a phenomenon to offer any chance of detecting its
causes. It might depend, as Laplace showed, on the positive
or negative action of the bounding meniscus. Now the adhe-
sion of plates of glass to the surface of different liquids, was
allowed to depend on the same cause as the rise of those
liquids in tubes of glass, and it was void of that complexity
which enveloped the phenomena of capillary tubes. I first
tried to assimilate the two, but quickly found that no positive
conclusion could be arrived at in this way. For instance,
there was a strong and variable attraction between mercury
and glass, so that the pan of a balance required a very heavy
load to detach them—but mercury experiences a depression
in tubes of glass.

Clairaut's theorem, however, will be found to reconcile
these cases; it directly tends to prove that the force of at-
traction might even amount to more than the force required
to separate a disk of glass from water, provided it could be
proved, that the cohesion of mercury is double, or more than
double that of water. I performed, again and again, the ex-
periment of the adhesion of a glass plane to the surface of
mercury, and found it was very difficult to make the valuation

of the weight required to separate them, equal in any two ex-
periments. Changes in barometric pressure, as determined
by an excellent instrument, had no equivalent influence. Va-
riations of temperature, seemed to exert a powerful effect on
the adhesion, yet it was by no means uniform. The hygro-
meter sometimes afforded comparable experiments, and then
again it gave conflicting results. However, after making a
great number of these, and similar trials, I found that mercury
chemically pure, which had sustained a long boiling, and
disks of glass which had been kept for some time at a tempe-
rature approaching 500° Fahr. would, in a majority of cases,
give identical results. But here again, if the glass were suf-
fered to cool, if it was touched lightly by the finger, or if a
particle of lead, or tin, or bismuth, was dissolved in the metal,
the results were instantly discordant.

Hitherto I had no theory or opinion to gratify, and I re-
solved to be led astray by no vain or crude notion, but making
experiment the means, to make truth as the *end.* I could not
suppose these variations by any means originated in altera-
tions of the attractive force, but was obliged to suppose that
they arose from disturbing causes, which acted at one period
more effectually than at another. To get rid of hygrometric
humidity, I brought some mercury to the boiling point, and
kept it so for some hours. It was then filtered, with the least
possible exposure to atmospheric air, to separate any impurity
which it might have contracted during ebullition. It was now
suffered to cool down to 212°, and a clean plate glass disk
laid on it at the same temperature. The glass was insulated
by a rod of gum lac, and the mercury contained in a cup
supported by pillars of the same substance, an amalgamated
wire proceeded from it, to the ball of a very sensible gold
leaf electrometer; as long as the mercury and plate were in
contact, the leaves of the electrometer hung parallel to each
other, but on separating them, and it required considerable
force to do so, a vast quantity of electricity was instantly de-
veloped, and the electroscope leaves were torn asunder by
the violence of the repulsion. On carrying the plate of glass
to another similar electroscope, by its insulating handle, the

leaves diverged, and continued striking the sides of the instrument for several times in rapid succession. On examining the electrical state of the two substances, I found the mercury to be negative, and the glass disk positive. The electric equilibrium is therefore disturbed by the separation of glass from mercury. Whilst they are in contact there is indeed no development capable of being recognized by the electroscope, their electricity is at that moment disguised, and from theoretical consideration, it is easy to show, *that they must be strongly attracting one another.*

The next step was to consider whether other fluids, as water and alcohol, would act like mercury.

But, without trying any experiment, it might be predicted that there are certain fluids so constituted, that the attractive force exerted between them and glass may exceed the cohesion they have for themselves. Now suppose, on laying a disk of glass on the surface of water, the disguised electricity caused an attraction between the two substances greater than the cohesion of the water, the result will be that the weaker force must yield to the stronger, and on lifting the glass up it will carry with it a thin sheet of water, held on its surface by the attractive force of the opposite states of electricity, which will be still disguised, and therefore the electroscope ought not to diverge. *All which is entirely conformable to experiment.*

As this position has a very near relation to the theory of Clairaut, I endeavoured to prove the truth of that experimentally. For this purpose I took a glass disk of a certain size, and one of copper of the same dimensions, carefully and thoroughly amalgamated; it was washed in distilled water, and made quite dry. On one side, three small rings were fastened, for the purpose of suspending it horizontally from the arm of a balance. It was gently lowered on the surface of pure mercury, in a cup, and the weight required to overcome the adhesion noted. This weight was regarded as measuring the cohesion of mercury. After each separation, the superfluous mercury was cleared from the disk; fresh mercury was used each time.

Exp. 1.   54 $\Big\}$ Weight required to overcome the co-
     2.   53.89   hesion of mercury.
     3.   54

The copper disk was now removed, and the glass substituted in its stead.

Exp. 1.   24.9 $\Big\}$ Weight required to separate the glass.
     2.   25.8
     3.   25.72

Now, on comparing these experiments, it would appear, that in no case did the attraction of mercury and glass amount to half the cohesion of mercury. And as mercury is depressed in capillary tubes of glass, the numbers ought, by the theorem of Clairaut, to be such as were found by experiment.

But, lest seduced by experiments which might simulate an appearance of truth into an incorrect theory, I resolved on making an experiment, which should be a severe test. This was to measure, with as much exactness as possible, whether the adhesion took place in exact proportion to the electricity developed. For if one kept pace with the other, that would be the strongest proof that could possibly be had, that one was the cause and the other the effect. In making such an experiment we have many disturbing causes in play.

If a disk of zinc is laid on a surface of mercury, it will be evident that a separation cannot take place, without the greater part of the electricity escaping before the contact is finished, owing to the conducting power of the zinc. Hence the resulting number determined by the torsion balance, is vastly inferior to what it would have been had the zinc not been a conductor. But if we substitute a disk of glass, in place of the zinc, owing to the nonconducting power of the glass, all the electricity developed remains attached to its surface. Hence, the apparent quantity of electricity developed by the contact of glass and mercury, is vastly superior to the quantity developed by any metal and mercury, whilst in truth it may be vastly inferior. This conclusion, to which I am thus led, receives strong support from the case of a galvanic battery and a common electrical machine, in which the quantity of electricity developed by the former is much

greater than that of the latter. If the contact could be broken before the electricity developed on the surface of the zinc was neutralized by meeting with the opposite electricity on the mercury, then we might make correct estimates of the quantity of electricity developed by contact. Now, upon making the experiment, it will be found impossible to separate the touching surfaces from each other *at once*. Suppose, for instance, a disk of zinc was partly separated from the surface of mercury, if, by the strong attraction existing between the two bodies, or other causes, the parallelism of the touching surfaces was disturbed; or if a mere filamentary drop of metal caused a momentary communication, all the free electricity of both surfaces, would in a moment be neutralized, and the resulting quantity, either as measured by the torsion balance, or the gold leaf electroscope, is merely the residuum of the very last point of contact.

This observation applies to the fundamental experiment of Volta, of the development of electricity between a plate of zinc and one of copper. If the disks could be separated before any of the contrary electricities had time to combine, much better proof would be had of Volta's assertion. A disk of iron, laid upon mercury, showed but little electricity ; a disk of zinc still less; but the electricity developed by glass was apparent, owing to the nonconducting power of the glass. Instead of doubting whether electricity is excited by contact, it is much more unlikely that it is excited by friction, which, indeed, amounts to no more than a series of successive contacts. Some may, however, object to the whole theory of electricity developed by contact, and may quote the experiments of De la Rive as decisive of the question; but I would ask such, how are we to account for the development occasioned on the surface of a disk of glass, a substance not liable to chemical action? Besides, I am satisfied, from personal observation, that the chief experiment of De la Rive is erroneous. *He* may not have succeeded in producing any accumulation in his condenser, by the contact of zinc and copper in a jar of nitrogen, for the ablest philosophers cannot *always* succeed in so delicate an experiment, but, in many

trials, I have done it, and am therefore satisfied in my own mind of the correctness of Volta's fundamental assertion.

With regard to the adhesion of plates to the surface of liquids, as keeping pace with the electricity developed, the terms in which that may be shown, may not be such as a rigorous measurement would give, but are such as the case admits. I took a disk of plate glass, of a highly polished surface, and on one side of it melted some gum lac, inclining the plate so as to spread the lac evenly over the surface. Whilst the lac was in fusion, a piece of plate glass was pressed down upon it, to give it a polished surface; but, as in separating it from the polishing glass, a splinter was torn from its surface, the numbers to be mentioned are rather too small for the lac. The disk was now suspended from the arm of a balance, to determine the adhesive force on the surface of pure mercury. First, with the vitreous side downwards, and then with the side covered with lac. The numbers were:

		Glass.	*Lac.*
Exp. 1.	Perfectly dry	33.74	29
2.	Moistened by the breath,	40	30
3.	Wet	45.87	45.50

Journ. Frank. Instit.

(To be continued.)

Minutes of the College.

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March 25th, 1834.

The Board of Trustees reported that they had conferred the degree of graduate in Pharmacy on the following candidates, who had duly complied with the requisitions of the College :—David Trimble, Joseph Trimble, Samuel P. Thomson, Alfred Guillou, Wm. Ellis, John H. Tilghman, Wm. B. Chapman, Augustine Duhamel and Stephen Proctor.

A letter of resignation from Wm. Marriott was read and accepted on the usual terms.

The Publication Committee made a report, which was read and accepted.

A committee was appointed on the subject of Patent Medicines, consisting of H. Troth, S. C. Sheppard, J. Scattergood, J. Turnpenny, F. R. Smith and C. Ellis.

A committee, consisting of S. P. Griffitts, Edw. Roberts and Wm. Biddle, was appointed to inquire into the expediency of publishing an advertising sheet in the Journal.

A committee consisting of S. P. Griffitts and C. Marshall was appointed to report on the expediency of establishing a record for the names &c. of persons wishing to obtain situations as apprentices to the drug business &c.

A memoir, by Wm. R. Fisher, Dr. J. B. Rodgers and G. W. Andrews, on an analysis of soup, which occasioned the death of a lady in Baltimore, was read and referred to the Publication Committee.

A complete list of Latin labels, in accordance with the nomenclature of the U. S. Pharmacopœia and other correct sources, alphabetically arranged, was presented to the college by Wm. R. Fisher, for the purpose of publication, and referred to a special committee, consisting of C. Ellis, Wm. Hodgson, jr., and J. Scattergood.

The Society then went into an election of officers for the ensuing year, when the tellers reported the following gentlemen duly elected :—

President—Daniel B. Smith.

Vice Presidents—Henry Troth, S. Jackson, M. D.

Recording Secretary—Charles Ellis.

Corresponding Secretary—Elias Durand.

Treasurer—Edward B. Garrigues.

Trustees—Warder Morris, Edward Needles, Dillwyn Parrish, John C. Allen, Edward Roberts, William Biddle and Richard M. Reese.

Publication Committee—Daniel B. Smith, G. B. Wood, M. D., Joseph Scattergood, Charles Ellis and R. E. Griffith, M. D.

June 24th, 1834.

The committe on advertisements in the Journal, made a report with the following resolutions which were adopted :—

1st. That the Publication Committee be authorized to insert advertisements on the cover of the Journal at the following rates :—For a whole page, two dollars ; for half a page or less, one dollar and a half for each and every number.

2d. That no persons be allowed to advertise unless he or they are members of the college. The proceeds arising from the same to be appropriated to the uses of the Journal.

3d. That no advertisement be allowed to remain more than one year, or in four successive numbers.

4th. That in case the number of advertisements sent in cannot be contained on the cover, the Publication Committee are authorized to publish an extra sheet to be stitched in the number.

The committee to whom was referred the propriety of establishing a record for the names, residence and reference of persons wishing to obtain situations as apprentices to the drug business &c., reported in favour of the same, with the following resolutions which were adopted :—

1st. That the committee be authorized to procure a suitable book, in which all applications for situations shall be entered, stating residence, age and reference of applicant, and that

members of the college alone shall be entitled to the use of said book, by having the privilege of entering therein a notification of a vacancy in their respective establishments, and the terms, if they so elect, by which said vacancy can be filled.

2d. That the committee be authorized to select a suitable member of the college, who shall take charge of said book, and cause the necessary entries to be made therein, and when such arrangements shall have been completed, to report the same to the Treasurer of the Publication Committee, or to the editor of the Journal.

3d. That upon notice of the completion of arrangements by Committee on Record &c., the Publication Committee be instructed to insert in the next number of the Journal an editorial notice of the proposed plan, with the residence of the member in whose charge the book shall be deposited.

The committee on Latin labels made a report and exhibited specimens. H. Troth was added to the committee, and it was resolved that said committee be authorized to print an edition of the labels, provided it can be done without implicating the funds of the college.

A letter of resignation from William Poole was read and accepted on the usual terms.

NOTICE.

In compliance with a resolution of the college of the 24th of June, 1834, the Publication Committee would call the attention of the members to the expediency of adopting the recommendation of the college as regards a record for applications of apprentices &c., the plan of which has been detailed in the minutes of the college. They also beg leave to state that the Committee on Records are now prepared to receive names, the book being deposited with S. P. Griffitts, No. 38 South Eighth street.

Miscellany.

Neutral Chromate of Potash.—M. Jacobson, in an interesting memoir, states that the neutral chromate of potash may be exposed to a very high temperature without being decomposed. Tow, cotton, linen &c., impregnated with a solution of this salt, become very combustible, and burn vividly, giving out much heat and light. The oxides of chrome and its different salts enjoy the same property, with less energy than the chromates of potash and soda. According to the author, this combustible power of chrome may serve to explain some phenomena which are observable in the fall of ærolites, as chrome has been detected in a great number of these bodies. M. Jacobson has taken advantage of this property of the chromate of potash, in the preparation of moxas. Those which he has used were made with blotting paper, saturated with a solution of one part of this salt in sixteen parts of water. These moxas burnt without the necessity of blowing on them, and gave out great heat, forming an eschar whose depth depended on the size of the roll applied.

The author also recommends the manufacture of matches of this article, by plunging a roll of cotton or linen cloth into a solution of the strength above mentioned. One important property of this salt is its great solubility, and the solution being a very efficient means for preserving vegetable and animal substances from putrefaction and fermentation; it also completely destroys the unpleasant smell of putrid meat.

The bichromate is possessed of the same powers. In fact, it is the best adapted for the preservation and disinfection of the above mentioned articles. The proportions are one drachm to two pints of water, or 1 to 250. Animal substances plunged into this solution undergo no change except in their nervous portions.

M. Jacobson has employed the chromate of potash for medical purposes, to fulfil a variety of indications. Externally, in a weak solution, it acts as a resolvant; and when concentrated, as a caustic. Internally, he has given it in one to two grain doses, as an emetic. In doses of half a grain to a grain, given every two or three hours, it occasions nausea, and may be employed in diseases of the lungs, and in some spasmodic affections. *Journ. de Chim. Med.*

New Anthelmintic.—In a memoir on the *Arapabaca* (Spigelia *anthelmia ?*) M. Noverre, a physician at Martinique, has drawn the attention of practitioners to this plant, as an anthelmintic which is infallible in its action, enjoys a sedative power, and is also possessed of a peculiar property, which admits of its being administered in all possible cases, without aggravating inflammatory symptoms, should they happen to complicate the presence of worms in the intestinal canal. This latter quality gives it an immense advantage over the turpentine and other stimulant purgatives, which are at present so universally employed in worm cases, and has been recognized in the plant by all physicians who practice in Guadaloupe, Cayenne, Martinique and South America.

The *Arapabaca* is an herbaceous annual plant of Pentandria Monogynia, growing in South America. The stem is round, and the leaves verticillate at the summit. It is commonly administered in the form of syrup, of which three spoonfuls are given to an adult, and a tea_spoonful to a child of three years of age. At the moment of administration it is customary to add a spoonful of cold water and a few drops of lemon juice. The same dose is repeated for three days, and then a mild purgative is given. A singular effect of the medicine, is sometimes the production of a slight amaurosis. The action of the plant generally takes place on the second, or even the first day after its administration.

Gaz. Med. and Amer. Journ. Med. Science.

Extract of Guaiacum.—M. Soubeiran makes some observations on this extract which deserves notice. The wood of the guaiacum is very resinous, and contains but a small proportion of extractive matter and gum. It results that cold water dissolves but little of the active principle, which is only dissolved in this menstruum by long continued boiling, during which the extractive matters dissolve in some degree the masses of resin, which have been softened and detached by the boiling. Hence we must conclude, that to derive any effects from watery drinks prepared with the guaiacum, this substance must be employed in large quantities, divided in very small pieces, and long boiled. The different formulæ recommend the extract of guaiacum to be prepared by decoction, and the resinous deposit which forms as the evaporation proceeds, to be carefully separated. It is evident from the above, that the extract thus obtained is entirely destitute of resin ; that is, of the most active principle of guaiacum. It is better, as recommended by the Geneva pharmacopœia, not to separate the deposit which forms during the evaporation, but to divide it, on the contrary, in the extract, by means of a small quantity of alcohol, or to use only the resin of guaiacum, or the decoction itself, which in fact is but a particular mode of obtaining the resin of guaiacum, diffused in an aqueous vehicle.

Journ. de Pharm.

Crystallized Sulphuric Acid.—Sulphuric acid marking 62° when exposed to a temperature of 32° F., is susceptible of crystallization. This fact was observed by M. Barruel, who states that the acid must be perfectly pure. The acid thus crystallized remained solid for two or three months at a temperature above 32° F.

Journ. de Chim. Med.

Agaric of the Olive tree.—M. Delille states that this vegetable production has no disagreeable smell, a slightly bitter taste, though not nauseous; its substance is not coriaceous, and its juice brown. According to Dr. Destrem of Alais, it produces super purgation when administered internally. It is the most highly phosphorescent of any known vegetable.

Ibid.

Principles of Acids.—M. Pelouse has announced that he has discovered a general law, applicable to all pyrogenous acids not containing azote. This he explains as follows:—Any pyrogenous acid being taken, this acid + a certain quantity of water and carbonic acid, or only one of these latter bodies, always represents the acid, or the organic matter to which it owed its origin.

Thus gallic acid exposed in a retort to a temperature of 210° R. is transformed into pure pyro-gallic acid, and carbonic acid wholly absorbable by potash, and these two products are exactly equivalent to the acid employed; at 250°, the results are carbonic acid, water and meta-gallic acid.

M. Robiquet states that in distilling meconic acid at 210° R. pure metameconic and carbonic acids are obtained, perfectly equivalent to the meconic acid employed; and that at 250° R., pyromeconic acid and pure carbonic acids formed.

When an acid is so volatile that the above mentioned decomposition cannot be effected, the same results can be obtained by fixing it by a base. Thus, for example, by saturating acetic acid by barytes, pyro-acetic spirit, and carbonic acid united to the barytes can be formed.   *Ibid.*

Hyparic Acid, (*Uro benzoic*, Berzelius.)—M. Boutin has obtained this acid with the greatest facility, and in abundance, by treating the urine of herbivorous animals with hydrochloric acid, evaporating to the consistence of a syrup, washing with small quantities of cold water, and then treating successively with boiling water and alcohol, with a little animal charcoal.   *Ibid.*

Iridium and Osmium.—M. Wöhler has given an easy method of extracting these metals from the black residuum of platina. He mixes this with an equal weight of common salt, and introduces the compound into a porcelain tube, which is to be heated to redness, and a current of chlo-

rine passed through it. A double chloride of osmium and iridium is formed which remains in the tube, whilst the osmic acid crystallises in a tubulated receiver adapted to the tube. The double salt and acid are then reduced to the metallic state, and purified in the usual manner.

Journ. de Chim. Med.

Lotion in Neuralgia.—M. Roux speaks in high terms of the following lotion, as an external application in neuralgia :

   ℞. Distilled laurel cherry water,   ℥iv.
     Sulphuric ether,   ℥i.
     Extract belladon,   ℈ii.   M.

Bull. Gen. de Therapeut.

Test for the purity of Sulphuric Ether.—If ether be not fully deprived of water and alcohol, it forms when united with oil of copaiva an emulsion, without dissolving it completely, whereas it is soluble, when pure, in every proportion.   *Amer. Journ. Science and Arts.*

Sympathetic Ink.—The following affords a sympathetic ink, far superior to any as yet in use. Dissolve a small quantity of starch in a saucer with soft water, and use the liquid like common ink ; when dry, no trace of the writing will appear on the paper, and the letters can be developed only by a weak solution of iodine in alcohol, when they will appear of a purple colour, which will not be effaced until after long exposure to the atmosphere. So permanent are the traces left by the starch, that they cannot, when dry, be affected by Indian rubber, and in one case a letter which had been carried in the pocket for a fortnight, had the secret characters displayed at once, by being very slightly moistened with the solution of iodine.   *Journ. Frank. Instit.*

Table Furnace.—In the following cheap and simple furnace, steel, and even the most refractory metals can be fused in a short time. Make a hole in the bottom of a Hessian crucible, holding two or three quarts— put inside of this crucible the cover of a smaller crucible, so that it may rest at about three-fourths of the depth. Make with a file several notches around this cover to admit the air freely, having the knob of the cover uppermost. On this knob place a small crucible containing the metal to be melted ; this crucible is to be covered ; put some lighted charcoal around it, and fill up with coke so as to entirely cover the interior crucible. Connect this apparatus with a blacksmith or other bellows, and keep up a constant blast, supplying coal as it is consumed ; in the course of a short time the metal will be fused.

Journ. de Con. Usuel. and Amer. Journ. Sciences and Arts.

Glass.—From the effects of weather &c. on glass, Mr. Faraday is of opinion, that it may be considered rather as a solution of different sub-stances in another, than as a strong chemical compound; and that it owes its power of resisting (chemical) agents, generally, to its perfectly compact state, and the existence of an insoluble and unchangeable film of silica, or highly silicated matter on its surface.

Rep. Pat. Invent.

New disinfecting Gas.—M. Ferrari having successfully employed fluoboric gas to remove the musty smell from a wine cask, tried it as a general disinfectant. He fumigated with this gas several rooms which were in a very fœtid condition, and completely destroyed the unpleasant smell. This gas is readily procured for fumigatory purposes. It merely requires a furnace or chafing dish and an earthen plate; on this latter is to be placed a paste made with two drachms of fluor spar, and two ounces of sulphuric acid. A paste is also to be made with two drachms of vitrified borax in powder and three ounces of sulphuric acid. This mixture being added to the former, the whole is to be heated, when there will be a copious disengagement of fluoboric gas. *Journ. de Pharm.*

Iodide of Starch.—M. Langlois has established the following as regards this substance:—1st. Pure iodide of starch, whether of a reddish, violet, blue or black colour, is always insoluble in a cold water. 2d. The aqueous solution of iodide of starch loses its colour from the application of heat, because the decomposition of the water transforms the iodine into iodic and hydriodic acids. 3d. The property it possesses, under certain circumstances, of again becoming coloured on cooling, depends on a subsequent reaction of the two acids above mentioned. 4th. Concentrated or diluted acids restore the colour only by uniting with the water necessary to the existence of the iodic acids; for if a few drops of sulphurous acid, the restoration of colour does not occur. 5th. Sulphuric, nitric and hydrosulphuric acids, chlorine, the alkalies, ether and alcohol, act on iodide of starch, as if the vegetable substances and the iodine existed in an isolated state. 6th. These facts lead to the following conclusion:— That iodine does not form a strictly chemical combination with starch, but a mixture solely characterized by its colour; consequently, iodide of starch ought not to be hereafter marked as a chemical compound.

Ibid.

New Animal Principle.—M. Lecanu announced to the Society of Pharmacy, of Paris, that he had extracted from mutton suet and lard, a new, solid principle, wholly distinct from stearine, as it fuses at 62° R., and is soluble in rather more than one hundred times its weight of cold ether. He states that it forms about a fourth of mutton fat. *Ibid.*

Itch Ointment.—The following ointment has been found very efficacious in the cure of itch :—

Sublimed sulphur, washed,	℥iss.
Chloride of lime,	℥ij.
Axunge,	℥vi. M.

Journ. de Pharm.

Antidote for Strychnine &c.—M. Donne proposes iodine as an antidote for the vegetable alkalies, and particularly strychnine. Chlorine also partakes of this property, the solution should be alcoholic. As these articles are, however, very acrid, they must be given with great caution, and in a very diluted state. *Ibid.*

Discharge of the stain of Indelible Ink by Corrosive Sublimate.—Dr. J. Dickson, of South Carolina, states that corrosive sublimate will discharge the colour produced by nitrate of silver on linen, cotton or the human skin. On the former the stain partially reappears after washing, but on the skin is permanently removed.

Amer. Journ. Science and Arts.

Dr. Delvincourt's Pastilles de Sante.

℞.		
	Aleppo scammony,	grs. vi.
	Tincture of senna,	gtts. xl.
	Carbonate of magnesia,	Зi. Эij.
	White sugar,	Зij. Эij.
	Powdered liquorice,	gr. viij.
	Gum tragacanth,	gr. v.
	Oil of anniseed,	gtt. j.
	Syrup of violets,	q. s. to make 8 pastilles.

These pastilles are well calculated for persons subject to acid regurgitations and flatulence. When it is merely intended to keep the bowels open, one or two are to be taken in the morning, before eating; if a full purgative effect is desired, the dose is to be repeated at intervals of a quarter of an hour. *Journ. de Pharm.*

Anti-chlorotic Pills.—These pills are considered by their inventor, M. Bland, as almost a specific in chlorotic affections.

℞.	Sulphate of iron in fine powder,	℥i.
	Carbonate of potash in dry powder,	℥i.

Mix well and add sufficient mucilage of gum tragacanth and powdered liquorice root to make ninety-nine pills. By triturating for half an hour the mass becomes sufficiently firm to be divided into pills. They are to be taken as follows :—The three first days, one in the morning, fasting, and another at bed time; the three following days, a third pill is to be taken at noon; the three next days, two in the morning and evening; the

tenth, eleventh and twelfth days, two pills three times a day; the three following days, three pills morning and evening; and finally, nine a day till a cure is obtained. *Journ. de Pharm.*

Anti-septic properties of hydrochlorate of Tin.—M. Tanffier, Professor of Chemistry at Strasbourg, has found that a solution of hydrochlorate of tin forms the most complete preservative of animal substances, as anatomical preparations &c. The deuto-hydrochlorate may be employed either for the preservation of wet preparations, or to facilitate the desiccation of dried specimens; for the first of these, the proportions are one of the salt to thirty of water; for the latter, one part of salt to twenty of water acidulated with hydrochloric acid. The salt of tin of commerce must not be used, as it deposits a subdeuto-hydrochlorate which disfigures the specimens. A deuto-hydrochlorate must be employed, which contains none of the proto-salt. This is readily made by dissolving granulated tin in nitromuriatic acid. *Ibid.*

Ascetic Ether.—M. Liebig gives the following method of preparing this article :—Distil a mixture of anhydrous acetate of lead, sulphuric acid and absolute alcohol, agitate the impure ether with a solution of carbonate of soda, to remove the small quantity of sulphurous acid that may be present, and then, without washing the liquid with water, separate it from the water and alcohol, and digest it on chloride of lime. With the following proportions, six parts of pure acetic ether can be obtained :—

Anhydrous acetate of lead,	16 parts.
Sulphuric acid,	5 "
Absolute alcohol,	$4\frac{1}{2}$ "

Ibid.

Odour developed by the action of Sulphuric Acid on the Blood.—M. Matteuci has endeavoured to ascertain the nature of the odorous principle developed in blood by sulphuric acid. This principle being disengaged by an acid, it was natural to suppose that it existed in a saline state and in the serum. He experimented on the blood of a goat. The concentrated serum was treated with sulphuric acid in a retort. The product on distillation was a mixture of lactic acid; of a volatile fatty acid, analogous to the caproic acid, and traces of hydrochloric and sulphuric acids. *Ibid.*

Oxalic Acid.—M. Robiquet has stated that the oxalic acid imported into France from England, contains almost always sulphate of magnesia and phosphate of lime. These salts, and especially the first, render the preparation of the different oxalates extremely difficult, particularly that of ammonia. M. Pelouze also observed, that in calcining a large quantity of oxalic acid to prepare formic acid, he found a residue of bisulphate of potash, equal to a fourth of the acid employed. *Ibid.*

Opium.—At a meeting of the Society of Pharmacy, of Paris, (Jan. 1834,) M. Robiquet communicated a letter from Dr. Gregory, in which this chemist stated that he had obtained sixty-four grammes of codeine from two kilogrammes of muriate of morphine, prepared according to his plan, and with this alkali had prepared a nitrate, with which he had made some physiological experiments.

M. Soubeiran announced that he had procured about the same proportion of codeine as found by Dr. Gregory, and also remarked that the new procedure furnished as much morphine as the old one, if this alkaloid be deprived of all the narcotine usually united with it.

M. Robiquet also communicated the following. Having prepared morphine by precipitating the muriate by ammonia, and dissolving the precipitate in alcohol without using charcoal, he obtained a white powder, insoluble in cold or boiling water, as well as in weak acids and alcohol. Concentrated sulphuric and hydrochloric acids dissolved it without change of colour, but it was precipitated from these solutions by water. The caustic alkalies also dissolved this substance, and when carbonated by exposure to the air afforded a crystalline powder. This substance mixed with a little water struck a deep red colour on the addition of chloride of iron. M. Pelletier announced, that he had discovered in the mother water of the precipitates of morphine by ammonia, a white substance of a pearly lustre, insoluble in cold, but soluble in boiling water, from which on cooling it was precipitated in a crystalline form. This substance was reddened by nitric acid, but did not strike a blue colour with the salts of iron; it left no residue when burnt. *Journ. de Pharm.*

Heat developed by certain Flowers.—Few persons are ignorant that the flower of the Arum *cordifolium*, of Madagascar, observed by Hubert in the island of Bourbon, increases in temperature at the moment of flowering from 19° to 25° R.; but Bory de St. Vincent has remarked, that the temperature of the climate during the day might have contributed to this thermometrical elevation. Afterwards, Lamarck and Senebrier observed this same augmentation of temperature in the flowers of the Arum *Italicum*. J. N. Linck also announced a similar phenomenon in another of the Aroideæ—the Caladium *pinnatifidum ;* but this fact was denied by Dr. Goeppert, of Breslaw. To settle the question, Dr. E. H. Schultz, of Berlin, repeated the experiment on this plant. The 1st of May, 1833, at noon, the temperature was 13° R.; at six o'clock, the flower began to give out an ammoniacal cadaverous smell ; at seven o'clock, its temperature was 17° R.; at eight, it was 19° R.; at nine, it was 20° ; at ten o'clock, it rose to 81° F. The heat never rose higher, and the next day the flower had returned to the temperature of the atmosphere. The other flowers of the same plant manifested the same series of phenomena, though they opened at different periods of the day and night. *Ibid.*

JOURNAL

Original Communications.

ART. LVI.—ON CONIUM MACULATUM.
By R. Eglesfeld Griffith, M. D.

Nat. Ord. Umbelliferæ.   *Sub. Ord.* Campylospermæ.
Sex. Syst. Pentandria Digynia.

Conium. *Calyx* with the margin obsolete. *Petals* obcordate, somewhat emarginate, very short and inflexed. *Fruit* ovate, laterally compressed. *Carpels* with five prominent, equal, undulate ribs; the lateral ribs margined. *Involucra* 3—5 leaved, partial one dimidiate. *Flowers* white, all fertile.—*Beck.*

C. *maculatum. Stem* erect, branched, smooth and spotted. *Leaves* large, tripinnate; leaflets lanceolate, pinnatifid, ultimate segments lanceolate, mostly entire; general and partial umbels many rayed; general involucre of several short lanceolate leaves; partial one few leaved, setaceous, directed to one side.—*Beck.*

Synon.   *Cicuta maculata.* Gærtner.
   C. major. Lamarck.
   Coriandrum maculatum. Roth.
   Conium maculatum. Lin. Sp. Pl. Willd. Sp. Pl. Nuttall.
      Beck, &c. &c.

Icon. Jacq. Austr. 156. Flore Med. 3. fig. 120. Bigelow. Am. Med. Bot. 1. fig. 11. Orfila. Med. Leg. t. 10. English Botany t. 4191.
   Common names. Hemlock. Poison Parsley. Spotted Parsley.
   Pharm. Conium maculatum. U. S.
   Officinal. The leaves.

Description. Root biennial, fusiform, white. Stem herbaceous, from two to four feet high, smooth, cylindrical, somewhat striate, hollow, marked with oblong livid or purplish

A

spots. Leaves alternate, large, smooth, sometimes spotted, tripinnate, the leaflets lanceolate, deeply dentate, the lower ones pinnatifid and almost pinnate. Flowers white, small, disposed in terminal umbels, composed of about ten or twelve umbellules on long peduncles. Involucrum of ten or twelve lanceolate, reflected, acute leaflets. Involucels of three or four ovate, acute leaflets, situated on one side. Calyx without apparent teeth. Petals five, nearly equal, obcordate. Stamina five, about as long as the petals. Styles two. Fruit oval, didymous, presenting on each of its divisions five saliant, crenate ribs, so that they appear to be covered with minute tubercles.

Nuttall mentions a variety *crispatulum*, with crisp leaves, whose ultimate segments are subsetaceously acuminate.

Habitat. The hemlock is a native of Europe, but is now naturalized in most parts of the United States: generally found in old fields, near roads, on the banks of rivers, &c. It is very common in some localities, whilst in others it is rarely to be met with ; thus in the neighbourhood of Philadelphia it seldom occurs.

Botanical History. Hemlock was very early recognized as a remedial agent of great power, and is highly recommended in the works of Hippocrates and Galen. Pliny also speaks of it as an antidote to the intoxicating effects of wine. The great use, however, made of it by the ancient Greeks, was as a poison for persons condemned to death for violation of the laws. This powerful article, like many others, fell into entire neglect, and does not appear to have been again employed until the experiments and eulogies of Stoerck, attracted the attention of the profession to it, when it came into general use, and was considered by many practitioners as one of the most valuable additions that had been made to the materia medica ; a more extended trial has not realized the extravagant eulogies bestowed upon it, and as is generally the case, when a reaction of public opinion takes place, it is not now perhaps, valued according to its real merits.

Medical properties and uses. All parts of the hemlock exhale a disagreeable and fœtid odour, which has been com-

pared to that of the urine of cats, and which is capable of inducing narcotic effects if respired for any length of time. This smell is most perceptible in the entire plant, and what is still more remarkable, it is stronger in the dried than in the fresh state. The taste of the leaves is nauseous and some-what bitter. It is stated that climate has a great influence in the development of the narcotic and other properties of this plant; an increased temperature occasioning a proportionate increase in the powers and virulence of the vegetable. Thus Mr. Colebrooke states that the extract made from English hemlock has scarcely any action on the system. In fact, whilst in the southern parts of Europe, the hemlock is pos-sessed of the most energetic qualities and is a virulent poison, in England, Germany, and other northern countries, it de-creases so much in power that, it is said, the leaves and root may be eaten with impunity.

Hemlock acts on the human system as a narcotic. When administered in a full dose, it occasions vertigo, dimness of sight, nausea, and great debility; when pushed further, these symptoms are greatly increased, and delirium or coma, para-lysis, convulsions, and even death, ensue; when it operates as a poison, the respiratory function appears to be chiefly affected, and the countenance becomes engorged with blood, as in cases of strangulation.

Hemlock was used by Stoerck in the treatment of cancer and scirrhus, but a subsequent experience has not shown that it possesses any controlling powers over these diseases, though it is undoubtedly useful as a palliative. No medicine is more subject to variation in its effects on patients than this, its mode of operation depending much on the idiosyncracy of the individual to whom it is administered. To prove useful as a narcotic, it must be given in gradually increased doses, till its poisonous effects begin to manifest themselves, as it has been fully proved that wherever it has proved useful the cure proceeded in a direct ratio to its sensible effect on the constitution.

The efficacy of no remedy depends more on the proper preparation of it than the present. The leaves should be

quickly dried in the shade, as they are deteriorated by the action of light ; when fully dried they must be kept in small and carefully closed bottles, in a dark place.

Pharmaceutical preparations and mode of administration.— The only officinal preparation recognized by the United States' Pharmacopœia is the extract, which is directed to be made by evaporating the expressed juice to a proper consistence. Dr. A. T. Thompson says, in speaking of this preparation, that it is made in two manners : the expressed juice is evaporated to the consistence of syrup, and the powder then added to bring it to a proper degree of thickness for making pills ; or the green feculent part of the expressed juice is separated by the filter, and added to the other part after it has been slowly evaporated, and clarified over a gentle fire.   It should always be borne in mind that few extracts are so readily injured by want of care in the preparation as that of hemlock, a slight alteration of temperature destroying all its efficacy.   It should also be noticed that the extract is preserved with great difficulty, as it is liable, without the greatest care being used, to become moist, when a saline efflorescence will appear on it, after which it is comparatively inert.

Dr. Thompson also states that the best form of preparation is the tincture, which may be given in any vehicle except one of an acid nature, which destroys its narcotic power. The expressed juice has also been recommended in Germany, in small doses, and as an external anodyne application, a cataplasm made with the fresh leaves bruised, has been found beneficial in many cases of local pain and irritated ulcers.

The dose of the extract is three or four grains twice a day, to be gradually increased till the narcotic effects begin to be developed ; when its administration is persisted in for any great length of time, the system becomes so habituated to it, that the quantity required to produce the desired result is very great.   The dose of the tincture is from ten to thirty minims.

Analysis. No complete analysis of this plant has been made though many investigations as to its general constituents have been recorded.   Schrœder has given the following as the re-

sult of his experiments on the fresh leaves; in 100 parts he found Resin 0.15, Extractive 2.73, Gum 3.62, Albumen 0.31, Gum fecula 0.18, Heterogeneous mass 92.4. This was a compound of acetic acid, sulphate, hydrochlorate and nitrate of potassa, malate and phosphate of lime, with the phosphates of iron, magnesia and manganese.

Brandes obtained an alkaline principle, to which he gave the name of *Cicutin* or *Conin*, by the following process. The fresh plant was digested in alcohol for several days, the tincture filtered and evaporated, the residue treated with water, magnesia added, and the whole evaporated to dryness; the residue treated with a mixture of alcohol and ether, when the conin was obtained from the filtered solution on evaporation. This principle acts on the system in very small doses, half a grain producing vertigo and great pain in the head.

ART. LVII.—APPARATUS FOR OBTAINING OXYGEN UPON A LARGE SCALE.

By ROBERT HARE, M. D., Professor of Chemistry in the University of Pa.

SINCE nearly as much time and trouble are expended in conducting a chemical process on a small scale as upon a large one, and since in my experiments, I consume large quantities of oxygen gas, I have lately employed the cast iron alembic represented in the figure, for the purpose of obtaining the gas from about twelve pounds of nitre. When in operation, it is made to occupy a suitable cavity in a furnace, built in a stack of brick work. The neck is so formed as to receive a large hollow knob of iron, from which a gun barrel proceeds at right angles. This knob is secured by a gallows screw, embracing the arms cast with the alembic. The juncture is to be luted with clay, added dry to a saturated aqueous solution of borax. To the orifice of the gun

barrel, a flexible leaden pipe is attached, by which the gas is conveyed to the gasholders or gasometer.
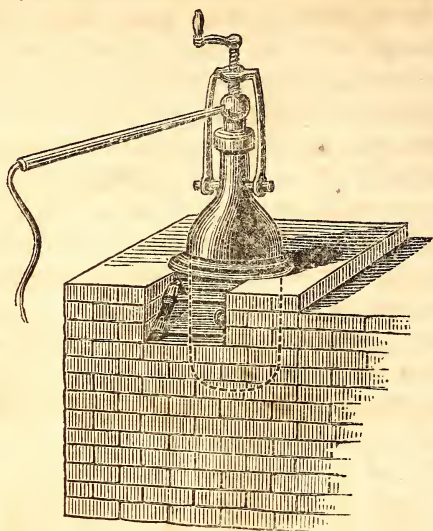
Care is taken to use no more fire than will bring over the gas, and the operation is arrested as soon as the impurity exceeds 20 per cent. By attending to these precautions, the gas is of a better quality—the first portion being nearly pure, and the alembic is less corroded. Besides, the *nitrate* being converted into *nitrite* of potash, by deflagration with charcoal, produces a tolerably pure carbonate of potash. As the equivalent of nitre, or nitrate of potash, is 102, and that of oxygen 8; 12 lbs. of the salt ought to give nearly 1-12th, or 1 lb. of oxygen, by yielding only one atom. One pound, or 7,000 grains of oxygen, divided by 33, the weight of 100 cubic inches of oxygen, gives 21,200 cubic inches to the pound of oxygen, or about $12\frac{1}{2}$ cubic feet, equal to 90 gallons.

It follows, that if, as Berzelius alleges, the nitrate is converted into a hyponitrite, we should get about 180 gallons of oxygen. It is best to keep the first portions of the gas obtained, separate from that which comes over subsequently.

ART. LVIII.—APPARATUS FOR SHOWING THE INFLUENCE OF
PRESSURE ON EFFERVESCENCE. By the author of the preceding
article.
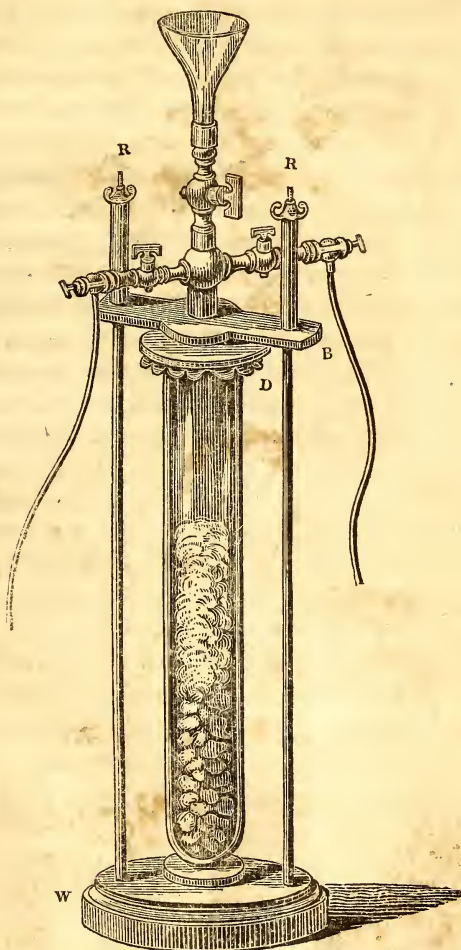
A CYLINDRICAL receiver, about 30 inches in height, is sup-
ported on a wooden pedestal, between upright iron rods fas-
tened into the pedestal, and at top cut into screws furnished
with nuts. By means of these screws and nuts, and an in-

tervening cross bar, a disk of lead, alloyed with tin to harden it, is pressed upon the rim of the receiver. The disk is so fitted to the rim of the glass, as to make with it an air tight juncture. In the middle of the disk there is an aperture, from which proceeds a stout tube, with a cock on each side, severally furnished with gallows screws, by means of which lead pipes may be made to communicate with an air pump on one side, and a condenser on the other. The tube is also surmounted by a cock into which a glass funnel has been cemented. Before closing the receiver with the disk, some carbonate of lime, or carbonate of ammonia must be introduced, so as to rise about one-third of the height of the receiver. I have found calcareous stalactites, like those from Weyer's cave, to be excellent for this purpose. The carbonate being introduced, and the disk fastened into its place, as represented in the figure, diluted muriatic acid may be added, by means of the funnel and cock, in quantity sufficient to cover the carbonate. Of course effervescence immediately ensues. If, under these circumstances, by means of the air pump, the atmospheric pressure within the receiver be lessened, the effervescence increases strikingly. On the other hand, if by closing the communication with the air pump, and opening that with the condenser, while this is in operation, the pressure be increased, it will be seen that the effervescence is proportionably diminished.

ART. LIX.—NOTE UPON FLUID EXTRACT OF SENNA.

By Charles Ellis.

(Read before the Philadelphia College of Pharmacy, Nov. 25, 1834.)

A class of pharmaceutical preparations has within a few years past been extensively introduced into use in England, and to a limited extent in this country, under the name of Concentrated Essences, or Fluid Extracts.

This concentration of the virtues of vegetable substances, in a convenient form for use and for preservation, is certainly

entitled to more consideration than it has yet obtained in our pharmaceutical and medical communities. The compound fluid extract of sarsaparilla, (although others have been introduced,) is almost the only preparation of the kind which has been generally and extensively employed. When properly prepared, and the properties of the sarsaparilla not injured by heat, it is certainly a very efficacious and convenient article, both for forming extemporaneously the Lisbon diet drink and the concentrated syrup of sarsaparilla.

Reasoning from analogy, there are yet very many medicinal plants in the vegetable kingdom which may with great advantage be subjected to the same ordeal.

The preparation which has claimed my attention, and which will form the subject of this notice, is the concentrated essence of senna.

To obtain the cathartic properties of this plant, uninjured, in a convenient form for immediate exhibition, must be desirable to the physician, as he may often wish to prescribe it either alone or combined with some other purgative, without being subjected to the loss of time attendant upon making the infusion, or the uncertainty of its being properly prepared.

I need not dwell upon the advantages which every concentrated preparation of the kind will possess in extemporaneous pharmacy, where the plant itself is extensively used, and where such concentration can be effected without any injury to its medicinal properties.

The following is the formula I have adopted, which produces a fluid extract corresponding in all its sensible properties, and I have no doubt will be found so in its remedial qualities with the English essence of senna, used for the preparation of the infusion.

Take of Senna,	lbj.
Alcohol,	Oiv.
Aq. Bullient,	Oviij.
Sacchar. Purif.	℥x.
Ol. Fœniculi,	gt.iv.

Pour the boiling water upon the senna in a covered vessel, and set aside until it is cold; then add the alcohol and mace-

rate for twelve days; strain it off with pressure, decant and filter, and distil off the alcohol; evaporate over a water bath to 12 fluid ounces, to which add the 10 ounces purified sugar, and dissolve with gentle heat. When cold, add the 4 drops of Ol. Fœniculi.

The English extract in my possession contains no essential oil, and it would probably be better to omit it in this, as it can be readily added when desired.

The above quantities will furnish f ℥18 of extract, containing the active properties of the given quantity of senna. f. ℥iss. of this extract will represent the strength of ℥i. of senna, consequently f. ℥iss. added to a pint of water, will form the infusion of the United States Pharmacopœia or f.℥iij. to ℥iv. of water, the dose for an adult.

The strength of this fluid extract is made to correspond with the English preparation; of the latter, however, f. ℥ij. are directed to form a pint of infusion of senna, but it must be observed that the formula of the London requires a larger proportion of senna for the infusion than that of our national pharmacopœia.

ART. LVIII.—ON THE ERYTHRÆA CHILENSIS.
By J. Carson, M. D.

Erythræa *chilensis*, Persoon.—From Steudel, " Nomenclator Botanicus," are obtained the following synonymes :— Erythræa *chachanlahuen*, Roemer and Shultes; Gentiana *chachanlahuen*, Molina; Gentiana *Peruviana*, Lamarck; Chironia *chilensis*, Willd. sp. pl.

Sex. Syst., Pentandria Monogynia, *Nat. Ord.* Gentianæ.

This plant belongs to the genus Erythræa, of Richard. The generic characteristics are the following :—Calix appressed, subpentagonal, five-toothed; corolla infundibuliform, tube long; anthers after fecundation becoming spiral; stigmas two, approximated, rarely simple; capsule elongated, one-celled, two-valved; seeds not marginated.

According to Persoon, it differs from Chironia in having a one-celled capsule; that genus being characterized by its four-celled pericarp, as also by its declinate pistil, but approaches nearer to Gentiana, from which, however, it is distinguished by the spiral anthers, distinct style, and approximated stigmas.

The species under consideration is nearly allied to E. *centaurium*, of Europe,* known by the name of lesser centaury, and appears to possess the properties peculiar to it. The E. *chilensis*, nevertheless, is distinguishable by its lanceolate, one-nerved leaves, of which the radical ones are not accumulated in tufts; by the arrangement of the flowers, which are pedunculate, not produced in bundles or corymbiform bunches on the summit of the plant; by the absence of the scaly appendages at their base; and finally by its shorter style. The height, moreover to which it attains, is not so great, and the general aspect is more delicate.

The root, which is branched, fibrous, yellowish white, and of moderate size, gives rise to a straight stem, ten or twelve inches high, appearing woody at its base. Above, as it ascends, it becomes branched, and finally, at its summit, very dichotomous. The branches and stem are slightly angular, in which particular, there is an agreement with several species of different genera belonging to the same family, and more especially some of our native plants, as SABBATIA *angularis*, GENTIANA *amarelloides* &c. The leaves are opposite, sessile, oval-lanceolate, green, smooth, and traversed by a single nerve.† The flowers are pedunculate, solitary at the summit of the branches, and in their axils, of a beautiful rose colour. The calix is divided into five, acute, straight segments; corolla infundibuliform, limb five-cleft, lobes obtuse; capsule one-celled, bi-valved.

The impression made upon the organs of taste, when chewed, is that of a mild bitter, perhaps a little more potent

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* Found in the state of New York; *Beck;* probably introduced.

† Acccording to Lamarck; although in the specimens which I have examined, the rudiments of lateral nerves were distinguishable, perhaps not sufficiently so to destroy the diagnostic character noted by that botanist.

than its congener E. *centaurium.* From the character and properties of the plant, we would be led to conclude that its medical uses and value are nearly allied to those of the other individuals of the natural tribe to which it is referred; and this, upon examination, together with the testimony presented with regard to its efficacy, will be found to be correct, although it is most likely that upon fair comparative trial there will be discovered virtues in it which are not to be detected in these. As a decided, but not unpleasant bitter, improving the appetite, and increasing the tone of the stomach, it will prove a valuable article of the materia medica, and as such has been for a long time in use throughout the country of which it is a native.

The herb is an annual, indigenous to Chili and Peru, growing abundantly on the arid plains of the lowlands, and in the pastures on the side of the hills. With respect to locality and habitat, there is no deviation from the known fact, that this class are generally natives of the temperate and higher latitudes, being less affected by cold than extreme heat. Whether it would bear transplanting to our own climate, is an experiment worth the trial. Great efficacy is attributed to it by the natives as a purifier of the blood, as also a remedy in pleurisy; hence, the common name by which it is called, is expressive of this property. As an aperient and sudorific, but more especially a tonic in the cure of intermittent fever, its powers are much vaunted. Thus Feuillé, in his " Voyage to Chili," assures us that he has experienced its beneficial influence upon himself, and M. Lesson corroborates the statement. M. Molina, who visited Chili the latter part of the last century, corrects a mistake which was announced in 1707, as to its being a native of Panama. He asserts that it is solely located in the countries we have mentioned, and gives as the true Chilian name, " Cachan la huen." Several other diseases are also cited, as yielding to its administration, as jaundice, worms, rheumatism and sore throat. The utility in these various disorders must necessarily depend upon the condition of the system and the mode of exhibition. Thus, after the excitement incident to inflammatory affections has

been subdued, it may prove useful as a deobstruent and gentle tonic; and the sudorific or stomachic effect will depend upon the temperature and quantity of the preparation administered.

The form of exhibition most convenient, is either a decoction or infusion made from the whole plant, and administered in larger or smaller doses, according to the circumstances of the case. For the introduction of this article, we are indebted to Dr. Ruschenberger, of the United States' navy, to whose kindness I have been indebted for the following note: " The ERYTHRÆA *chilensis* has been used by him during a period of nearly two years on board ship, in the form of infusion, the proportion being ℥j. to the pint of water. Dose, a wine glassful three or four times daily. He found it useful in all cases where mild tonics were indicated, and particularly so, when cinchona, quinine and gentian would not remain upon the stomach. In one case, complicated with gastric irritation, it was most serviceable. The Indians in Peru use the plant as spring physic."*

For the Philadelphia Journal of Pharmacy.

ART. LIX.—PHARMACEUTICAL ESSAYS.—No. 1.

I HAVE watched the progress of the Journal of Pharmacy with much interest, and being desirous to contribute something to its pages, have thought that a few essays on the practical part of our profession, would probably be a more valuable contribution than any thing more ambitious.

They will not, it is true, add to the fame of the Journal; they will not be copied into other periodicals, nor will abstracts or translations be republished abroad. My object will be answered, if they do good at home, if they attract the attention of an intelligent apprentice, or if they even

* This medicine can be obtained at Mr. F. R. Smith's Drug Store, S. W. corner of Walnut and Eighth streets.

excite care and awaken an ambition to excel in a village seller and compounder of drugs.

Perhaps there is no business in which *character* is so essential to success as ours; nor any in which that success,— certain in the end to be the reward of skill, and patience and integrity,—is so slowly reached.

It is a great mistake in a young man to suppose that he can open a shop, and by the glitter of newly gilt bottles and drawers, a costly counter and handsome shop windows, step at once into a good business. He must not be disappointed if years pass over his head with but a small increase of a business, scarcely more than sufficient to meet his personal or family expenses. In these respects, our business resembles the practice of law and medicine, in which some of the most eminent practitioners have arrived at the honours of their profession, after a long and painful probation. Pretenders and quacks,—mere shopmen, will always outstrip the modest and industrious man of science in the career of popular favour. But let the latter not be disheartened; if he keeps steadily in view the integrity which is the ornament, and I would add the characteristic of our profession, he will infallibly succeed in the end. He will moreover, by being thus trained in the " res angusta domi," acquire habits of frugality, of method and simplicity of living, that will be more valuable than wealth, as they furnish all the means of enjoyment that riches can bestow, on a broader and less perilous eminence. An exposition of the moral influences upon the community, of small and regular accretions of wealth, as contrasted with the sudden overflow, would be a valuable addition to ethical science, and throw great light upon the causes of the national character of whole nations in Europe.

The first consideration which claims our attention is, what are requisites for a good apothecary?

In selecting an apprentice, I would take as my first choice a lad of quick apprehension, of sobriety above his years; kind and civil in his disposition; polite in his manners; not over talkative, and settled and studious, yet active and industrious in his habits. His qualifications must be, in addi-

tion, a competent knowledge of accompts; the writing of a neat, legible, uniform hand; enough Latin, French and German to be at no loss in translating and construing; a turn for Natural History; some knowledge of Botany and Chemistry, and a considerable share of mechanical ingenuity and manual dexterity. If a lad possessing all these qualifications passes his apprenticeship in a shop conducted on just principles, and which enjoys a large patronage, he can scarcely fail to become distinguished in his profession; and the want of any one of them will detract from his usefulness. Of all the faults in an apprentice, carelessness is the most dangerous, and the most incurable. One or two mistakes, even of a somewhat serious nature, may be overlooked and placed to the account of accident and our common imperfections; but a repetition of offences of carelessness should always be followed by dismission from the business, nor should any false and misplaced lenity induce a conscientious master to overlook them. The youth had better seek his fortune elsewhere, than in an apothecary's shop, where his thoughtlessness may endanger life, and bring misery and distress upon whole families.

There is another requisite which I have not mentioned that ought not to be omitted; and that is personal neatness and cleanliness. I would as readily forgive my cook for being a sloven as my apprentice. What can be more disgusting than dirty hands at work at a potion that is to be administered to a patient of delicate stomach, rendered doubly so by debility or inflammation? I shall have much to say on this subject but it is so much of a habit, that if an apprentice does not bring it with him to the shop, he will not acquire it; and it must therefore be ranked among the preliminary qualifications. Having thus introduced myself to the readers of the Journal by this desultory preface, I must defer the commencement of my regular design to the next number. The essays will consist of plain and minute,—some may think them trivial directions,—for the manual operations of the shop. And no one who is aware what slight difficulties will often arrest us in an untried course, will despise these minute directions.

The genius of Faraday himself has not made a more accep-
table present to the chemical science, than his treatise on
manipulations.

<div align="right">S.</div>

ART. LXII.—PHARMACEUTICAL NOTICES. No. 10.

James' Powder.—We are indebted to Dr. J. R. Coxe, for
the following extract of a letter from Dr. Robert E. Robinson
of Petersburg, Virginia, respecting this celebrated article of
the materia medica.   The possession of this recipe, however
authentic it may be, will not at the same time obviate the
difficulty, as under the name of calx of antimony, either the
peroxide or the protoxide may be used, thus leaving the com-
position and properties of these powders as uncertain as be-
fore.

" I take the liberty of enclosing you a copy of Dr. James'
formula for making his celebrated powder. Of its correct-
ness there can be no doubt; it was given to my father by
Dr. Reynolds, who was a fellow student with and received
it from a son of Dr. James.   It has subsequently been com-
pared with the formula of Mr. Adams, who frequently pre-
pared the powder in London, for Dr. James, and it corres-
ponds exactly with his.   It was written by Dr. James in the
following manner:

> R. Antimon. Tatarizat.   Ði.
> C. C. C.
> C. Antimon.   *aa*   Ðv.   M.

Ft. pulv. in chartul. continent. singul. gr. xxi. dividendo.
The second article is, Corn. cerv. calcinat., and the C. an-
timon. is the oxide (calx) of antimony.

The genuine powder is always put up in papers containing
nearly xxi. grains."

Extract of Rhatany. This preparation, when properly
made, is by far the neatest and most efficacious form for ex-
hibiting this drug. It, however, often disappoints the prac-

titioner from the adulteration to which it is subjected when not prepared by the apothecary himself. These adulterations are various, the most common, however, is fortunately the least objectionable, namely, with kino, as this latter possesses most of the properties of the rhatany. At the same time, as it differs in some respects in its remedial qualities, and as all sophistications, even the most innocent, should be discountenanced by the pharmaceutist, the following method, proposed by M. Guibourt, of detecting this admixture may prove useful. If an ounce of boiling water be poured on ten grains of extract of rhatany, in about two hours the solution will become opaque and milky. Kino, treated in the same manner, gives a clear solution. The solution of extract of rhatany, treated with acetate of lead and diluted with water, gives a reddish precipitate, whilst that of kino affords an ash gray deposit. The solution of extract of rhatany treated with tartar emetic, does not become turbid or afford a precipitate for some time, whilst that of kino instantly gives a whitish yellow one; hence if a precipitate immediately takes place on treating a cold solution of extract of rhatany with this test, it has been adulterated with kino.

Tartrate of iron and potash. The process for preparing this salt with metallic iron and cream of tartar, which gives a better product than that prescribed by the United States Pharmacopœia, has the disadvantage of being very tedious; this may, however, be obviated in a great measure, by placing a few pieces of clean copper in the vessel, thus rendering the iron electro-positive, in which state the acid salt acts on it more rapidly; no fear need be entertained of an admixture of copper, as this metal is not affected as long as any of the iron remains undissolved.

Unguentum Plumbi subacetatis. Mr. Sprague recommends the following as a neat and valuable preparation of lead, rendering every other form, and especially the *ceratum plumbi subacetatis,* quite superfluous.

C

R. Emplast Plumbi ʒvj.
Liquor Plumbi subacetatis f. ʒiss.
Olei Olivæ f. ʒij.
Adipis ʒvj.

Liqua simul emplastrum et adipem, dein sensim adde li-
quorum et oleum ut fiat unguentum.

ART. LXIII.—MEDICO-BOTANICAL NOTICES. No. 5.

Robinia pseudo-acacia. This well known native tree does
not appear to have received that degree of attention to which it
is justly entitled, for although highly esteemed for the valuable
properties of its wood, which from its durability, is exten
sively used for tree nails in ship building, and posts for fences
and other enclosures; this is commonly considered to be the
extent of its usefulness; this, however, is far from being the
case, as almost every portion of it is endowed with some
useful property.

The leaves, when prepared in the same manner as indigo,
may be advantageously used as a substitute for that article;
they afford an excellent nourishment for horses and cattle,
either in a fresh or dry state. The flowers, which are very
odoriferous, are said to possess antispasmodic properties, and
furnish the basis of a very agreeable syrup, according to Bo-
NAFOUS, (*Ann. Hort.* ix. 168,) an excellent liqueur has also been
prepared from them. It has been asserted by GROSIER, (*De-
scrip. de la Chine* i, 507,) that they are used by the Chinese
to produce that beautiful yellow so remarkable in their silks
&c., by the following process: half a pound of them are ga-
thered before they are fully blown, and roasted over a clear
and gentle fire, in a clean copper pan, continually stirring
them briskly; when they begin to turn yellow a little water
is poured on them, and boiled till it acquires a deep colour;
it is then strained, and half an ounce of alum and one ounce of
finely pulverized shell lime added, when the dye is fit for use.
We have given these directions, in hopes that some of our

readers may be induced to make the experiment, though we think that there may be some mistake with regard to the plant, as it appears strange that a perfectly white flower like that in question should furnish so rich and permanent a yellow dye. Merat and De Lens, (*Dict. Univer. Mat. Med.* vi. 101,) also state that these flowers furnish a palatable dish on being fried.

The seeds, which are furnished in considerable quantities, are somewhat acrid, but by infusion in water, they lose this quality and furnish an excellent farina. In their natural state they are eagerly eaten by poultry, and on expression yield a large proportion of limpid oil.

The bark is susceptible of being spun, and forms a strong fabric; the inner portion is sweet, somewhat resembling liquorice in taste, but is emetic and cathartic in large doses; that of the root is the most powerful. Dr. Gendron, (*Ann. Clin. de Mont.* xxiv. 68,) relates a case of some schoolboys who had incautiously chewed this bark, and swallowed the juice, and in about three hours afterwards presented the symptoms of the ingestion of an acro-narcotic poison, as vomiting, lethargy, and slight convulsions. There is a variety cultivated in gardens which is small and has yellowish flowers, which may perhaps be the plant from which the dye is obtained.

Spilanthus oleracea. This plant, which is a native of South America, has of late years attained some celebrity on account of its antiscorbutic and odontalgic qualities. Being an annual of very rapid growth, it succeeds very well in our climate, and in fact, when once planted, it is with difficulty eradicated, its seeds being scattered in all directions. The whole plant has an excessively acrid, aromatic taste, somewhat resembling that of peppermint, but much more powerful. It has been much used in France as an antiscorbutic, and if we may judge from the eulogies bestowed upon it, may be considered as one of the most powerful we possess. From the analysis of M. Laissaigne, it appears to consist of, 1, a very acrid, odorous, volatile oil; 2, a gummy matter; 3, extractive;

4, acid malate of potash; 5, wax; 6, a yellow colouring principle; 7, different salts. The best preparation, when used as an odontalgic, is the alcoholic tincture made from the flowers; this acts like other stimulants, by creating a counter irritation, and a copious flow of saliva. As a tooth wash, the diluted tincture is perhaps preferable to any we have in use, especially when the gums are spongy and in bad condition.

Besides these properties it is said to possess others, which, however, have not been sufficiently confirmed; thus Poupeé Desportes speaks of it as a hydragogue, and Descourtilz states that it will operate as a vermifuge. It certainly deserves an extended trial, and we would draw the attention of our readers to it.

Sagittaria sagittifolia. This beautiful aquatic plant, which grows in abundance in all our rivers and wet meadows, is deserving of attention. The roots furnish farinaceous bulbs, which are usually found in the clay soil below the stratum of mud by which the plant is surrounded. They are sometimes several inches in diameter, and are assiduously cultivated in China and Japan, where they furnish no inconsiderable part of the food of the inhabitants. Even in the raw state, they afford a wholesome article of diet, and when properly prepared furnish a white and light fecula resembling the best arrow root. These roots were extensively used by our Indians, and are still employed among the western tribes.

Matico. Under this name Dr. Ruschenberger, United States Navy, lately presented to the Academy of Natural Sciences, the leaves of a plant which are highly esteemed in Peru, as a styptic. They are alternate, cordate, long, recticulated, and pubescent beneath; on pulverizing them they have an aromatic odour, somewhat resembling that of mint; on chewing them, they at first appear to be insipid, but in a short time their taste becomes very acrid, not unlike that of the *Lobelia inflata*, though more aromatic. Their cold infusion is yellowish, and does not appear to be possessed of

any very sensible properties. Dr. Ruschenberger states that they are considered so infallible a remedy for staunching blood, that the Peruvians never went into a campaign without carrying a bundle of it with them. Mr. Frost, who brought this plant before the notice of the Medico-Botanical Society of London, observes that it was likely the matico was a species of Piper. This seems probable from the appearance of the fragments of stems in the parcel sent by Dr. Ruschenberger. When they are to be used, they are coarsely pulverized, and thus bound over the wounds.

ART. LXIV.—ON CERTAIN CHEMICALS OF COMMON USE IN THE SHOPS. By C. Adamson.

(Read before the New York College of Pharmacy, March 6, 1834.)

Circumstances frequently occur in the common business of the shops, which lead to investigations of importance. We frequently receive articles from various sources which pass currently as good, because they appear so to the eye, and we rest satisfied with that imperfect examination, until some accident happens which developes their real character, showing that we have been imposed upon, or that the manufacturer, from carelessless, has been deceived himself. I would, therefore, advise that every chemical article should be examined critically before it is used in the shop. A very simple analysis will generally suffice 'to determine its character if genuine; and this may be extended to minuteness, if results are discovered which lead to doubts of its purity. I am led to make these remarks from the following circumstance :—A manufacturing chemist inquired of me, about two months ago, what preparations of zinc were likely to sell. I mentioned crystallized sulphate, acetate and white oxide, giving him an order for the latter, telling him that what we had been using for some time back I did not like so well as parcels we formerly had from England. In a few days he returned, informing me that he could not make oxide of zinc white enough

for sale. He showed me three different samples, which were made from various specimens of the zinc of commerce, but all of them afforded an oxide of a pale flesh colour, varying but little from each other, and he wished to see a sample of ours to examine and compare. He mentioned the circumstance of Strommeyer finding in Hanover that all the apothecary shops were supplied with carbonate of zinc, instead of oxide, (which fact was also communicated to me by Professor Rogers,) and expressed his opinion that our parcel was also carbonate for the same reason. This was found to be the case; for upon examination, 82 grains of it lost 26 during its solution in half an ounce of dilute sulphuric acid, which was attended with great effervescence.

I then obtained from different stores in this city seven samples of the article the greater portion of which were distinctly known to have been manufactured in Philadelphia, and they all lost from 24 to 27 grains in 82, by submitting them to the same operation. Two of these samples afforded turbid solutions, which, on repose, deposited a grayish sediment resembling the impure oxide of zinc, commonly called tutty powder. The loss of weight was in all these instances greater than that of the carbonic acid, which I imagine arose from the violence of the effervescence which elevated some of the lighter particles of the carbonate of its stream. The eighth sample, and the only one I could procure, proved to be oxide of zinc; it lost a few grains during its solution, which might have been carried off by the action produced by the acid on two or three small pieces of metallic zinc, which were mixed with it. The pale orange colour of the samples of oxide before mentioned, appears to depend upon a portion of cadmium, which is united to the zinc in its natural state, and as the carbonate of this metal is perfectly white, its presence is not to be observed in the preparation at present in use in this city.

Whether the medical qualities of this metal differ from those of zinc, I am not able to say; but it is evident, that as the carbonate of zinc contains nearly 27 per cent. of acid, besides 24 proportionals of water, the activity of any com-

position which may be made from it when the prescriber expects to have the oxide, must be only half the strength intended.

I also wish to call the attention of the members of the college to an article, no doubt imported from France, and sold by Messrs. Carnes. I have had two parcels within three or four years. It is sold as the hydriodate of potash, but it contains at least fifteen per cent. of a very difficultly soluble salt, which, from its having in some of the phials a lemon colour, I at first took for iodate of potass, but the strong acids did not decompose it, as would have been the case had it contained iodine. Five grains separated from a solution by the filter, were not perceptibly diminished in ʒij. of cold distilled water; on the application of heat to ebullition, it dissolved, and formed, on cooling, longer crystals than the granular form it was in before solution; its more easy solubility in hot water than cold, proved it was not sulphate of lime, which it much resembles. I am inclined to think, from a cursory analysis, that this difficultly soluble salt is a chloride of potassium, combined with a very small portion of some metallic salt, and probably arising from the vessel in which it was made.

ART. LXV.—REPORT OF COMMITTEE OF INSPECTION ON A CASE OF POISONING BY OIL OF WINTER GREEN.

(Read before the New York College of Pharmacy, June 1, 1832.)

Your committee of inspection, to whom was referred the investigation of the properties of oil of wintergreen, in relation to the cases of poisoning by it in the Sixth Avenue in the city, respectfully report:—That they obtained a copy of the verdict of the coroner's jury, setting forth the fact of its exhibition, and the consequences thereof; also, copies of the affidavit of Isaac Hammond, by whom the mistake was committed, of Levi Van Kluck, the owner of the shop, and of Oliver Holmes, a neighbour and acquaintance of Van Kluck. That they

went to the shop of the soi-disant doctor Van Kluck, in the Sixth Avenue, whom they saw and conversed with on the subject, that he produced the bottle whence the fatal potions had been taken, the contents of which appeared to your committee to be oil of wintergreen of rather thinner consistence than is generally met with, purchased, as represented by said Van Kluck, of J. C. Morrison in Greenwich street, and stronger than usually sold; but to two of your committee who tasted it, it did not appear to differ materially from other parcels of that oil. The quantity taken by each of the persons who died, he endeavoured to show, by pouring into a tumbler glass what he said was a similar quantity, appearing to be somewhat more than a fluid ounce. He insisted that there was not any deleterious principle in the said oil. Remarking, also, that he had sold many gallons of the compound, (which in the above instances, was intended to have been given, strongly flavoured with the oil in question,) and that he had never known any untoward symptoms to have been produced; he also mentioned several instances of the frequent use of the herb, which accorded with facts within the knowledge of one of your committee; he showed to the inquirers samples of his medicine, and of his spring beer, the former of which tasted strongly of wintergreen; and although by him called "bitters," of very little besides it and the spirit of which it was composed.

Oliver Holmes, who was with a number of other customers in the shop, corroborated these statements, as far as his knowledge extended, informing your committee that he had been benefitted by the above medicine in a state of ill health which he called "dyspepsia;" to which Van Kluck added, that it was a cure for that disease, also for dropsy and gravel, besides several others; and he pursued his subject by reprobating the treatment of the unfortunate persons by the physicians called to their aid, particularly the bloodletting, which he said was carried to a great extent, and of no use. As to him, your committee have only to remark, that they felt surprised that any person, however ignorant, could place confidence in one seemingly possessed of so little intelligence.

Of the oil in question. It is prepared in large quantities in the country, from GAULTHERIA *procumbens,* or winter-green, class Decandria, order Monogynia, of Linnæus, or of the natural order Bicornes, of the same author, and of class 9th, order 51, or Ericæ of Jussieu, described as possessing tonic, astringent and refrigerant properties. It usual colour is deep red, of a rich spicy flavour. Its taste, at first bland and sweetish, becomes quickly acrid on the tongue, and extends its heat quickly to the fauces, even when not swallowed, in some measure like the root of mezereon, but its effect is not so durable. It is in general use among the Indians to the north and east, as a medicine, and is frequently used by new settlers in place of common tea.

From all the circumstances, viz. the various affidavits, leaving no grounds to doubt the fact of this oil having been the cause of the death of the persons in the cases alluded to— the quantity of it taken—the appearance of the stomach after death, which your committee are informed by a member of the faculty who was present at the examination, showed strong marks of general inflammation, and the frequent use of both oil and herb, from which it is produced in a diluted state without any bad consequences ensuing, altogether lead your committee to think that it does not possess in itself any deadly principle, but simply caused the destruction of life in the above instances by the irritation it produced in this delicate tissue, by the quantity and very concentrated form in which it was applied to it.

Your committee beg leave to add, that some further experiments are at present going on, the result of which, if interesting, they will communicate at some future meeting.

D

ART. LXVI.—SOME EXPERIMENTAL RESEARCHES TO DETER-
MINE THE NATURE OF CAPILLARY ATTRACTION.

By John W. Draper.

The second and third experiments were made to determine
whether, when the surface was wet, a greater or a less
weight would be required to separate them. From theoretical
considerations, it would appear that the disks ought to adhere
more strongly when water intervenes; for the rupture does
not take place in consequence of the attractive force of the
mercury and glass being overcome, but in consequence of the
cohesion of the watery particles being overbalanced; this is
evident, as a film of water is to be found on both surfaces;
but in the last two cases, the theory would likewise indicate
that the numbers determined by the balance were increasing,
while those determined by the electrometer should be de-
creasing; and even in the last case the electrometer ought to
be insensible. It may likewise be remarked, as connected
with this, that the gum lac adheres less forcibly to mercury
than glass, and only increases in adhesion when exposed to
the same source of moisture, in proportion as one to three.
Yet, when both substances *are wet*, the force of adhesion be-
comes the same, for then it represents the cohesive power of
water. This experiment gives a salutary caution, that in at-
tempting to compare the force of adhesion, with the electricity
developed, every part of the apparatus and substances em-
ployed, ought to be free from moisture. If the proof plane of
Coulomb be used, it will likewise be necessary to have regard
to the conducting power of the surface under trial; without
this precaution erroneous results would be obtained, arising
from unequal distribution over the surface after separation;
this, in circular disks, might vary from unity at the centre to

2.9 at the circumference, if the conducting power were perfect.

Having constructed disks of sulphur, beeswax, gum lac, sealing wax, and crown glass, of exactly the same shape, weight, and dimensions, with the side that was to repose on the surface of pure mercury as highly polished as possible, I determined the adhesive force of each of these; the resulting numbers, the mean of several experiments, were as follows:

Crown Glass . .	55
Gum Lac	50
Sealing-wax . . .	50
Sulphur	45
Beeswax . . .	20

The mercury experimented upon, had been three times distilled with care; a very dry day was selected, and after all moisture had been expelled by heat, the experiments were made in a vessel containing chloride of calcium. I satisfied myself of the absence of all electricity, by the test of an exceedingly sensible gold leaf electrometer. The results afforded by a torsion balance were—

Glass	18
Lac	16
Sealing-wax . . .	$15\frac{1}{2}$
Sulphur . . .	11
Beeswax	7

Although these do not bear the same proportion to each other, as the numbers in the preceding table, yet they follow exactly the same order. But fearing there might be some mistake arising from the construction of my torsion balance, I took a long magnetic needle, and furnishing it with a gilt pith ball, insulated by a filament of gum lac, I noticed the effect caused by the moveable ball and proof plane. The numbers reduced to the standard of glass, in the last experiment were—

Glass	.	.	.	.	18
Lac	.	.	.	.	16.2
Sealing-wax	.	.	.	15.82
Sulphur	.	.	.	.	12.1
Bees-wax	.	.	.	7

I afterwards found that the same results might be obtained, in a rougher manner, by observing the distances at which each of the excited disks would effect a gold leaf electroscope.

The numbers thus found would probably agree better with those obtained by adhesion, if they were properly corrected. In the first place, the conducting power being variable in the different substances, will derange the result, and the expression for those in which it is greatest, ought to increase. There is another source of error, for which I see no remedy, —the attractive force exerted between glass and air; there can be no doubt, that air actually *wets* glass, and this is a circumstance of some importance to chemists. I have noticed in an analysis of gaseous matter, traces of the presence of atmospheric air, which I am certain could be derived from no other source but this.

But if it cannot be rigidly proved that electricity is the cause of capillary attraction, by an exact correspondence of rigorous measures, such an opinion could be supported by no slight argument, if it was found that electricity exercised an apparent control over all the phenomena of capillary action.

Reasoning on the principle laid down, I succeeded in ascertaining in a distinct and positive manner, that electricity has complete control over chemical action, and that it can disturb the position of liquids in tubes, with the same ease, and quite as powerfully, as it can disturb the position of the magnetic needle. It might at first be supposed, that this could be effected by electrifying mercury, or water, in a capillary tube, furnished with a cistern, by means of a common machine ; but a moment's consideration would show that this is an error. Owing to the expansive force of the electric fluid, it will, as is theoretically shown, occupy only the ex-

treme part of the arrangement, and from this circumstance no particular result could be reasonably expected. Hence, though water be electrified in this manner, until it gives out sparks an inch or two long, it will remain in its original position in the tubes, even though the finger be approached very close to it. It is immaterial whether the electricity be positive or negative, or whether mercury or water be employed.

But whilst electricity of tension only affects the surface of bodies, electricity produced by the galvanic battery, occupies itself with their constituent atoms. It is from this source we must look for the effect. Now, if water be placed in a tube by itself, and the terminal wires of a galvanic battery being immersed in its extremities, it showed no disposition to be affected, the reason would be obvious; the attraction of capillarity is between the water and the glass tube, whilst the electric current passes down *through the water*, without at all interfering, so as to alter the position of the suspended fluid. From this it is evident, that the tube must communicate with one pole of the battery, and the suspended liquid with the other. Further, the tube and the liquid must not only both be capable of conducting electricity, but it is also essential, that their conducting power should not be the same, or the electricity will pass from one to the other with too great velocity to cause any disturbance. To meet all these requisitions, and likewise to observe the reaction upon the capillary tube, I took a tube of glass, one-tenth of an inch in diameter, and wetted it thoroughly with water; I then placed it in a cup containing mercury and distilled water. The water rose in the tube; and on lowering it into the mercury, the mercury experienced its usual depression. The apparatus might now be regarded as a tube of water, containing mercury depressed in it by capillary attraction. I now made this tube of water positive by uniting it with a battery of fourteen Wollaston plates, and on making the mercury in the cup negative, the mercury in the tube instantly rose.

The only form in which the experiment will succeed, is when the positive pole dips into the *water* of the capillary tube, *and not into the mercury.* It is immaterial whether the

negative pole dips into the mercury, or the circuit be completed elsewhere.

Some might incline to suppose, that as the rise takes place from the negative to the positive wire, it might receive ample explanation from the fact, that the electric current passing in the same direction, carries it mechanically with it. If the effect depended on this cause, the position of mercury ought to be deranged, by the passage of a stream of electricity from a common machine, but this is not the case; for strong explosions from a Leyden phial, may be passed in either direction through the tube, even at the risk of bursting it, and the position of the mercury will still remain unchanged. But the most decisive experiment is this: if a positive platinum wire pass down the axis of a capillary tube into the water, and the tube and its wire be very cautiously elevated, whilst the mercury communicates as before with the negative wire, *at a particular position,* the water will experience an instantaneous depression, and will fall in the tube the whole length of the platinum wire. The particular position is, when the immersed extremity of the tube has just quitted the surface of the mercury, and the effect arises from an increased attraction between the mercury and the water. When a copper wire from the galvanic battery dips into mercury, it becomes wetted, and the mercury rises with a wave-like motion. But as in most other molecular actions, the phenomena are very complicated, the mercury having risen on the wire, capillary attraction, strictly speaking, is at an end; the mercury overcoming the attraction of the wire for itself. Change of capacity for caloric is the immediate result of change of composition, and heat is either absorbed or developed.

I have said, that, in the arrangement pointed out, a rise takes place; I would not, however, be understood to mean that such is always the case. That rise may be converted into a fall, and still all the reasoning will apply. All that results from the theoretical action of a battery, is an increased pressure. This, under the control of disturbing causes, will produce a motion, but the direction of that motion is entirely governed by circumstances.

Before proceeding to the converse of this experiment, to show the depression of liquids, I may observe that all these changes of position are accompanied by certain and definite changes of figure of the bounding surface. It appears from the theory of Laplace, that an increase of attractive force ought to be accompanied by such a change of figure; which is the result of an equilibrium of the variable attractive force, and the cohesive power of the liquid. Reasoning upon these principles, it would appear that as the attraction between water and mercury increases towards equality, with the value of half the cohesive force of mercury, the bounding surface becomes of a less curved figure, and a rise takes place. From being convex upwards, as the surface approaches horizontally it becomes plane, and finally ends in being concave. That a rise ought to take place, is shown by Laplace; for suppose the chord of the arc given by any section of the meniscus, to remain constant, the curvature of the arc becomes more and more sensible, forming a greater part of the circumference, whose radius becomes smaller and smaller, at the same time, the number of molecules contained on the bounding surface increase, and by a necessary consequence, the action of the meniscus itself increases; we may therefore assume, that, if a variation of the attractive force produces a change of figure, change of figure *may* be a legitimate indication of variation in attracting force.

In reversing the former experiment, so as to cause wetting liquids to rise higher, and mercury to be depressed beneath its usual level, regard must be had to disturbing causes, which may arise from the chemical nature of the liquids. A descent of mercury may be caused by altering the connexion of the polar wires. The mercury which, in the former experiment, was made negative, is now to be made positive, but as soon as this is done it becomes covered with a coating of oxide, which blocks up the tubes, and prevents any decisive action. Liquids capable of dissolving the oxide must be employed, and with sulphuric acid the rise and fall take place, on altering the communication. The simultaneous ascent of mercury, and descent of water, is instructively shown thus :—

Place two plane plates of glass parallel to each other, so that
there may be a communication from their sides, with mer-
cury and water in a reservoir.   Make the water positive, by
means of a platinum wire extending into a space between the
glasses; on making the mercury negative, it immediately
rises between the plates, and the water falls through the open
sides, carrying with it any small particles of dust, or other light
substance, placed there to show the path of the current.   On
breaking the communication, the currents return, flowing
backwards, and things remain as before making the experi-
ment.

It might here be objected, that no motion whatever ought
to take place, from the elements laid down, the water having
just as much tendency to descend as the mercury to rise;
for, from the very nature of disguised electricity, the positive
and negative electricities are in the exact ratio for neutralis-
ing each other, which ratio is that of equality; an increased
pressure only ought to take place.

This objection is easily obviated, when we remember that
water and mercury differ in many respects; for instance, the
inertia of the one is greater than that of the other; their ac-
tion on the glass which included them is very different, and
all these things are to be considered as modifying the effect.
On electrifying two substances, these trivial circumstances
exercise a powerful influence, and may even determine a
motion in direct opposition to what it ought to be.   To che-
mists this is no new doctrine; these very forces, acting on
this very electricity, determine so many chemical changes in
direct opposition to affinity, else how can we give an expla-
nation, that iron turnings decompose water at a red heat,
and at the very same temperature peroxide of iron is decom-
posed by hydrogen gas.

Aided by these considerations, I have contrived an ar-
rangement to illustrate them experimentally.   It consists of
an inverted syphon, one of whose legs may be about one-
tenth inch in diameter, and the other one-half inch. Mercury
is to be poured into the syphon, until it rises in the smaller
leg; pour upon it, in that leg, sulphuric acid; make the acid

positive, and the mercury negative, and instead of a rise, a fall takes place. Change the communication, and there is a rise.

It may be remarked, that this alteration of rise and fall is decisive of the idea, that motion is produced by the mechanical action of the currents; if that were the case, the motion in both instances should be alike, if the direction of the current was the same in both cases. I took the unequal legged syphon, filled with mercury and sulphuric acid, and caused the current to pass in its course along the wire of a galvanometer. The sulphuric acid was now connected by a wire passing from it to one of the galvanometer cups; the mercury in the wide leg had a thick amalgamated wire dipped into it, which proceeded from the negative pole of the battery. On completing the communication by a similar wire from the positive pole, the galvanometer needles traversed west. On reversing the communication, the mercury rose, and the needles traversed east. On substituting spring water for the sulphuric acid, and making the water positive, it instantly fell, vibrating about its lowest point of descent, and when it rose, vibrating about its highest. It is to be remarked, in making this experiment, that when the mercury is rising, the watery tube moves with a waving motion between the glass tube and the mercury, and if the battery be in sufficiently vivid action and the tube small enough, it will pass down in direct opposition to the laws of hydrostatics, by several inches of mercury, and make its appearance in the other leg of the syphon.

I now took a syphon, whose legs were of equal diameter, and having made the water positive and the mercury negative, there was a rise, the needle traversing west. On reversing, and making the water negative, the mercury blackened the tube, but did not move, the needles going east. Now, connecting this and the last experiment, we find in one, a current deflecting a needle westward, causing a rise, in the other a fall. This I take to be proof sufficient that the mere motion of a current, dragging the mercury in its path is quite unequal to produce the phenomena.

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Perhaps some may imagine that a reasonable account may be rendered of this rise and fall, on chemical and hydrostatic principles. In the case where mercury rises in straight tubes, hydrogen gas is freely developed from its surface, and though most of the volatile metals are prone to form combinations with hydrogen, as tellurium, potassium, and arsenic, it nevertheless does not follow that these compounds must be gaseous ; for instance, the solid compound of hydrogen and potassium of Gay Lussac and Thenard, and a similar compound of hydrogen and arsenic, formed by Davy. If, it may be said, an union of this nature took place between mercury and hydrogen, and the resulting compound was soluble in metallic mercury, it would, in all probability, be specifically lighter than mercury, as is the case with the ammoniacal amalgam ; and on its formation it would disturb the hydrostatic equilibrium in the syphon, and a rise must take place to compensate for such disturbance. In the case where the mercury falls, why may not the hydrogen escape, and the oxygen unite, either with the water or the mercury. Now from Dulong's experiments it appears, that the oxide of hydrogen is soluble to a certain extent in mercury itself, and peroxide of mercury is of greater specific gravity than water. Either of these suppositions, would account for a movement in the branches of the syphon.

In the first case, where a compound of mercury and hydrogen is assumed to be the cause of a rise, I would merely remark, that we have no warrant for supposing any such compound can be formed, and generally to the whole objection I make this reply.—The rise takes place *in a moment,* the instant the current passes, so that there is not sufficient *time* for any compound to be formed, at least not to an extent sufficient to disturb the hydrostatic equilibrium. Again, in the case of a rise in a tube of pure water, it is evident, after the current has ceased to pass, the mercury ought either to remain suspended, or slowly to disengage hydrogen whilst sinking. Now neither of these results agree with observation; the moment the current ceases, the hydrogen drops, without disengaging the minutest bubble of gas. In repeating this ex-

periment, care must be had that the water is pure, or at least only rendered a sufficient conductor, by substances which contain no alkaline matter; for instance, if chloride of sodium be present, the resulting amalgam will disengage hydrogen for some time after the current has ceased to pass; but even in this case, sufficient evidence may be had against this objection, for the sinking of the mercury is almost as instantaneous as its rise, and it is not until after *it has fallen*, that the disengagement of hydrogen is perceived. Again, if oxide of mercury be the cause of the fall, it should be remembered that the fall ought to be permanent. And as to peroxide of hydrogen, it is a substance so notoriously liable to decomposition, and requiring so large a volume of oxygen for its formation, that I cannot for a moment conceive any possibility of its presence at all affecting the experiment.

Again, it may be doubted, whether the current itself, or some peculiar quality of it, is the cause of these phenomena; or whether they do not arise from the electro-dynamic action of the wire, upon currents traversing the mercury.

On approaching a strong bar magnet in any position with regard to the apparatus, no disturbance ensues, and the poles of a powerful horse shoe are equally inert. A battery, consisting of a few large plates, though it will make the galvanometer needles turn violently round, will by no means cause that change of level, which a number of smaller plates will occasion. It therefore requires that peculiar voltaic arrangement, which is exactly suited to chemical effects. A larger number of moderate sized plates, has the most energetic action. Hence another important inference may be drawn— if, as we see the same arrangement controls capillary attraction, that is most effectual in disturbing affinity of chemical action; and if chemical attraction is identical with electricity; then there is great reason to suppose capillary attraction is referrible to the same cause.

The evidence which it was my intention to bring forward, to show what strong suspicions there were for supposing that capillary attraction is due to electricity, may be regarded as complete; but a number of arguments may be adduced

in addition. I would ask, what better proof have we of the truth of any scientific theory; we see that all the phenomena of capillary action may be legitimately accounted for by the laws of electricity; we see that the measure of the one is the measure of the other; that when the one increases or decreases, so does the other, in the same proportion, and that the one has that control over the other, that a cause might be expected to have over an effect. But lest, deceived by specious appearances, we should form an erroneous opinion, let us see how new facts will elucidate the matter, holding ourselves ready to forsake any theory, however plausible it may appear, the moment we find one fact that contradicts it. In doing this, I have to require a distinction to be made between things that *cannot* be explained on these principles, and those that I am unable to explain. For in treating on an intricate subject like this, where the actions of that unaccountable agent ELECTRICITY, are deeply involved, it would be vain entirely to rely on my humble ability. There was a saying of old, that it required a clever charioteer, to turn his horses in a narrow chamber,—how then shall I hope to guide such an ungovernable steed, and grope the way in darkness?

I believe that it was Sir H. Davy who first noticed the convulsions of mercury, when electrified under water. In a watch glass, I placed about an ounce of mercury, and poured on its surface water, rendered a better conductor by a drop of sulphuric acid. The mercury was now made negative, and on dipping the positive pole of the battery into the water, a rotary motion was produced, exactly similar to that which would be exhibited by a current passing from a blow pipe over the surface of the water. Now, it is to be remarked, that the arrangement is the same as when mercury rises in a straight capillary tube; the mercury in both cases is to be in connexion with the negative pole. On reversing, and making the mercury positive, no motion is produced in either case.

As the battery I made use of in all these experiments, consisting of fourteen three inch Wollaston plates, was much too powerful when charged in the ordinary manner, I poured the exciting fluid from the cells, and replaced it by water rend-

ered slightly saline by common salt. The action of the battery was now much moderated, and I observed, on repeating the experiment, that on making an arrangement as described, for producing currents, the mercury suddenly became more globose. On breaking the communication, it gradually dilated again, becoming a very oblate spheroid, much flattened at the upper part. At the time of its greatest convexity, a slight current was seen, carrying light bodies in its vortices, and betraying the energetic gyrations, which the particles of the mercury were accomplishing, whilst the little globule was detained, in such a state of force. On reversing, there was a motion produced. It is easy to show that this change of figure proceeds from a change in attractive force of the bodies in contact. I made this experiment in another manner; I took a glass tube of such a diameter, that it would contain a little acidulated water, and a globule of mercury, without the spherical figure of the latter being deformed. In the bottom of the tube, a platinum wire was sealed; this the mercury reposed upon, and it likewise served to communicate with the negative end of the battery; on passing the current an instant deformation of figure took place. The upper surface flattened, and the mercury touched the tube all round, in a complete ring. Its surface was ploughed by gentle currents, and in the thin aqueous tube thus formed, decomposition rapidly took place.

Let us pause, to make a few useful applications of the knowledge we have acquired. Nearly one hundred and fifty years ago, Huygens saw with astonishment, that in a tube of a few lines in diameter, mercury might be made to stand at the height of seventy inches. This phenomenon is constant, when the interior of the tube is quite dry, and the mercury desiccated by long boiling. It receives an explanation on these principles. When the mercury is made to descend, in a dark room, to its usual barometric height, the vacuum is pervaded by a lambent electrical flame. This phenomenon takes place, to a greater or less extent, in all barometers; those that are most free from moisture and gaseous matter, being most liable to it. In tubes of a large diameter, it is

manifested by an adhesion of mercury to the tube, which must be overcome by tapping the case of the instrument, or other mechanical means. I took a tube four-tenths of an inch in the bore, and having made it perfectly clean, I exposed it to as strong a heat as it could bear, without altering its figure; whilst it was hot, one end was sealed, and the other bent like a syphon barometer. Mercury which had been distilled three times, at a low temperature, and then made to boil violently for a few minutes, was poured into it; it was again boiled for rather more than four hours. The adhesive force of the mercury to this tube was remarkable; it could never be brought to stand at the same altitude, in two consecutive experiments. The slightest motion filled the tube with a pale electrical flame.

On the same principle may be explained an experiment, made by P. Abat, which has not a little puzzled philosophers. In a syphon, whose branches are of equal diameter, pour some mercury, so that its height in both branches may be equal. Make the mercury rise in one of the legs by inclining the syphon, and then slowly return it to an upright position; the mercury will now stand higher in the branch in which it rose, the hydrostatic equilibrium being destroyed. From the principles laid down, it is plain this should be the case. When the syphon is brought to its greatest inclination, the tendency of the electricity developed by the contact of glass and mercury, is to produce a species of adhesion, and if the motion in restoring the syphon to its former position be gradual, that adhesion has time to take effect.

Dutrochet, I believe, for I have not yet seen his original work, saw that endosmosis might receive an explanation from the action of electrical currents, founded on a galvanic experiment, made many years ago. Circumstanced as I am with regard to his writings, I cannot criticise them. If, however, he supposes the endosmosis is due to electrical currents, I submit that it is an error. For it appears, that a very simple explanation may be given. The liquid, whatever it may be, that has the greatest attraction for the bladder, or other porous substance, passes through by common capillarity; as soon

as it reaches the upper system of tubes, it unites with the other liquid; in the case of alcohol and water, for example, the water passes through, and unites with the alcohol: this compound has not the same force of capillarity as the water alone, consequently the water still continues to rise, its upper surface being in a manner removed, by uniting with the alcohol, just as the sap continues to rise in trees, as the upper end of each filamentary column is removed, by evaporation from the surface of the leaves.

Setting out with these ideas, I attempted to determine the matter experimentally, I stretched a disk of bladder over a light metallic ring, and suspended it horizontally in equilibrio from the arm of a balance. The liquids experimented on, were taken from the same phial as had been used for verifying the endosmosis—they were, distilled water, proof alcohol, and a mixture of each. I expected that by ascertaining the force required to detach the bladder from them, I should know their comparative cohesion. From other circumstances I knew that the ratio of the electricity developed by alcohol and bladder, and by water and bladder, was something less than that of six to ten.

Exp't. 1.	Force required to lift a disk of bladder from	20.1	33.4	23
2.		20.1	33.1	23
3.		19.8	33	23

It appears that the water passes through bladder with a force represented by 33; whilst the alcohol only attempts the passage with a force represented by 20; of course, the greater pressure prevails, and the water passes. On arriving at the other side of the bladder, it forms a compound with alcohol, and the backward pressure now amounts to 23. The water, therefore, still continues to rise. I have used these numbers in a rough manner; they do not accurately express the forces, but are a sufficient approximation for the purpose of illustration.

Guided by these principles, it appeared to me, that a material improvement might be made on the common galvanic battery, if the electricity developed during the mutual diffusion of liquids into each other, was added to that developed by two metals,

acted on by a chemical menstruum. To put this into practice, I made an arrangement in a glass tube, half an inch in diameter, consisting of two metallic coils, one of copper and one of zinc, to each of these a copper wire was soldered. The zinc coil was at the bottom of the tube, through which its copper wire passes, being made water tight with gum lac. The copper coil was situated at the upper extremity, and about one inch distant from the zinc. Now on putting a strong solution of muriate of soda in the bottom of the tube, and dilute muriatic acid, of less specific gravity, at the top, during the act of diffusion of these liquids into each other, a strong current of electricity, it was presumed, would pass along the connecting wires. It was with no small pleasure I observed a full corroboration of the truth of the principles on which I was reasoning; for on introducing the poles into a drop of water, instantaneous decomposition ensued with considerable energy.

A plate of zinc, one-eighth of an inch in width, and half an inch long, fitted with a similar copper plate, by the aid of the solution above referred to, is perfectly adequate to the decomposition of water. A battery of half a dozen such tubes, bears a favourable comparison with one of fifteen Wollaston plates on the old construction.

In continuation of this research, on the power that one substance possesses of penetrating into the pores of another, as nearly measured by their power of cohesion, I was led to repeat the experiments formerly made by Guyton De Morveau, on the adhesion of disks of metal, to the surface of quicksilver. The results were—

1	Gold	-	-	-	-	6	Zinc
2	Silver	-	-	-	7	Copper
3	Tin	-	-	-	-	8	Antimony
4	Lead	-	-	-	-	9	Iron
5	Bismuth						

Which is likewise the order of their affinity,—another proof that chemical affinity and capillary action, are to be attributed to the same cause.

In repeating these experiments, I had occasion to notice incidentally, the production of heat, the moment mercury was

touched by gold. This remark was made many years ago by Boyle, as may be observed in his essay on the Mechanical Origin of Heat and Cold.

It might be predicted, from the experiments of Pouillet, that gasses must exhibit the same phenomenon. A piece of red hot charcoal, when I had cooled it in mercury, and then immersed it in an atmosphere of ammoniacal gas, had its temperature suddenly raised. When it was surrounded by a mixture of atmospherical air and hydrogen gas, and the temperature slowly raised, the heat developed by the charcoal was such, that it set fire to the gaseous mixture, acting in the same manner, though not so energetically, as spongy platinum would have done.

This principle offers an explanation of the decomposition of the peroxide of hydrogen, and persulphuretted hydrogen, by several substances which have no chemical action on them. These compounds only exist at certain low temperatures, for a heat much short of 212° Fah., entirely decomposes them. The metals, and metallic oxides, likewise act in a very energetic manner; I am now speaking of the peroxides, which do not pass to a state of higher oxidation, during the action. On dropping any of these into a tube, containing peroxide of hydrogen, an instantaneous explosion ensues, and the tube becomes hot. The decomposition takes place, in consequence of the heat disengaged by capillary action; at least, the heat which must of necessity be developed from that cause, would be sufficient to decompose the layer of peroxide of hydrogen, immediately reposing on the oxide, even if no other disturbance was in action. And agreeably to this, we find, that in many cases oxide of silver will be reduced itself, whilst it is reducing peroxide of hydrogen.

There is a point, in connexion with this, to which I would refer. A liquid cannot repose on the surface of a solid, without the disengagement of caloric. A gas cannot pass through a capillary tube without changing its temperature. Hence, in the phenomenon of endosmosis, of liquids and gases, the membranous partition is of necessity obliged to undergo a change of temperature. For this reason it is well worth the

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inquiry of physiologists, whether animal heat may not in a measure be traced to this source. It is impossible that such changes as take place during respiration, should proceed without exaltation of temperature, but it is equally impossible, that the phenomenon of endosmosis, taking place at every breath we draw, should proceed without exaltation of temperature in the membranous septa of the lungs, and the whole vital apparatus. From Dulong's researches it appears that, supposing all the oxygen that has passed into the state of carbonic acid, has really combined with carbon during respiration, and supposing all the oxygen which has disappeared has combined with hydrogen to form water, and that the sum of these two quantities of caloric, accurately represents the whole quantity of heat produced by the chemical changes of respiration, the amount is too small by one-tenth, and often by two-tenths, of the actual quantity.

I might now proceed to add something concerning those chemical decompositions, which may be effected by the mere action of capillarity, as exemplified in the cases of deutoxide of nitrogen, atmospherical air, and pure ammonia; and likewise to show how much these processes are controlled by the condensation of those gases. I might likewise speak of those molecular motions, which silently take place in the innermost recesses of solid bodies, and indicate the laws of the movement and equilibrium of those systems of atoms. For we are not to suppose, because the texture of solid bodies appears to be the same for many years, that there is no movement of their constituent parts. I might proceed to consider the magnitude and shape of those atoms, and how one system of them may be made to disturb the motions of another; the distance there is between atom and atom, and how it is affected by their orbital paths, and vibratory oscillations. I might show how the disguised electricity, produced by near approximation, acts on these elementary systems as a centripetal force, and how the caloric which is produced under these circumstances acts as a counterbalance to prevent their fall on each other. But so long as hypothetical considerations are involved in these researches, and until the geometrical investigation is corro-

borated by extensive recourse to experiment, we cannot hope to come to an undoubted conclusion.

If we look once more on the mass of evidence which appears, we shall find, that all the phenomena of capillary action may be explained according to the laws of electricity,—that electricity is produced in some of the chief cases of capillary attraction, its development keeping pace with the intensity of attraction. We shall find, that whatever disturbs the production of the one, disturbs the action of the other. That the formulæ of Clairaut, developed many years ago, receive, upon this doctrine, experimental corroboration—and that the attractive force may be measured by the torsion balance. If further proof were wanted, we should find it in the complete control the galvanic battery has over the height of a column, whether of mercury or water, suspended in tubes, making it rise and fall at pleasure; and what ought to be an argument to a chemist, this is done by that arrangement which effects that affinity, which is said to be due to electricity. The endosmosis of Dutrochet is explained, not hypothetically, but by recourse to the balance; and to show that we may employ this theory to advantage, it has proved a guide for discovering arrangements in galvanic batteries of unusual intensity. It is found that the electrical excitements of different metals and mercury, as determined by their affinity, keep pace with their capillary action. The singular evolution of heat, produced by molecular action, affords another passing proof to that type—the polar connecting wire of a voltaic battery. The physiological application of this fact, is striking and important; and if any thing be wanting to complete the chain of evidence, it may hereafter be found in the power that capillary attraction possesses over chemical affinity.

Christianville, Va. July, 1834.

Jour. Frank. Inst.

ART. LXVII.—ON MANNITE FROM THE BULBOUS CELERY.

By M. Payen.

For several years past, I have pursued a series of investigations, on those immediate principles of vegetables which occur in large proportion, and which may be useful to man.

I have already shown, that in tubers of the Jerusalem artichoke and dahlias, the most abundant immediate principle is inuline, a substance which is transformed into sugar by many acids, but upon which diastase has no action.

That the sugar of melons is crystallizable, and identical with that of beets and the sugar cane.

Finally, M. Henry and myself have ascertained that the sweet potatoe contains not only an analogous sugar, but also furnishes a fecula which is as agreeable as the best foreign arrow roots.

M. Tollard having lately sent me a root of the bulbous celery, (*Celeri rave,*) for examination, I soon perceived that it contained no starch, but that mannite existed in it in large quantities, accompanied by a coagulable azoted substance, some salts and traces of an essential oil. Not only was the proportion of mannite remarkable, but the ease with which it could be extracted also attracted my attention. The plan I followed, might be followed on a large scale with advantage.

By the aid of a grater, the root was reduced to a pulp, which was subjected to a strong pressure. The expressed juice was very viscous. It was boiled, when an abundant scum separated, and the viscidity disappeared.

The substance, thus coagulated by heat, was placed on a filter, washed and dried; on calcination it gave azotized products; it formed 0.04 of the juice.

The fluid separated from the scum was filtered through coarse animal charcoal, then rapidly evaporated to a syrupy consistence, and suffered to remain at rest in a cool place. On cooling, it formed a mass of crystals radiating from numerous centres. This mass, subjected to a gradual pressure,

afforded mannite in white, acicular, brilliant crystals, which by a single operation, namely, by wetting them and again submitting them to pressure, were rendered sufficiently pure for use.

When they were dissolved in hot alcohol, they separated on cooling, in the form of elongated crystals, united in groups presenting the appearance of spherical aigrettes.

The mannite formed about 0.07 of the juice. This proportion may vary according to the soil, the culture, the season &c. It is certain that the most abundant principle in the bulbous celery is mannite, and that it can thus be obtained more economically and purer than from manna. Its agreeable taste, and the pectoral qualities observed in it ought to entitle it to notice.

<div align="right">*Journ. de Chim. Med.*</div>

ART. LXVIII.—NOTE UPON CREOSOTE. By A. Buachner, of Munich. Translated for the Journal of Pharmacy, by Charles Ellis.

The extended labours of M. Reichenbach of Blansko, in Moravia, upon tar, his discoveries of creosote, of eupion, of parffian, of picamar and pittakal, are so well known in France, as to render superfluous any discussion of the preparation and properties of these products of dry distillation. Upon creosote alone, the preparation of which I have had occasion to make many experiments in my laboratory, I will venture to communicate a note, with respect to its medical properties and mode of preparation.

M. Reichenbach directs the creosote to be prepared from the tar of beech wood by six distillations, and the product to be dissolved three times in a solution of caustic potass, and each time to be precipitated from that solution by sulphuric acid.

I have found that creosote may be obtained of the same purity from the tar of pine wood, and that by observing the

precautions which I am going to indicate, it is unnecessary to repeat the operations so often.

1st. In the first distillation of tar, which is done in an alembic, care must be observed frequently to remove the product, (oil of tar,) and to change the receivers. At first nothing but eupion comes over, which floats on water, but as soon as any of the oil poured in water precipitates to the bottom, it is formed in great part of creosote, and the distillation must be continued until the residuum has acquired the consistence of black pitch.

2nd. The oil which is heavier than water, is then agitated with a small quantity of concentrated sulphuric acid, to deprive it of ammonia, and to assist in its discolouration.

3rd. It is then mixed with an equal volume of water and agitated, and afterwards rectified in small retorts.

4th. The product of this distillation, which sinks in water, consists, for the greatest part, of creosote; having dissolved it in a hot solution of caustic potass of specific gravity of 1.120, this concentrated solution was left for some time exposed to a gentle heat to deposit. The eupion then, if any of it remain, will float on the surface, and must be carefully removed.

5th. After this alkaline solution has become cold, a slight excess of sulphuric acid is to be added to it, by which the creosote is set at liberty.

6th. The creosote separated from the solution of sulphate of potass, is again distilled in small retorts, taking care as in the first distillation, occasionally to remove the product; the distillation advances slowly at first, with much agitation, on account of the water present. The first product consists of water and a little eupion, which must be rejected. The residuum in the retort, is formed of a brownish mass.

7th. If the creosote obtained in this manner is again rectified two or three times, without any addition, it is sufficiently pure for medical use.

The operator will soon discover the precautions necessary to be observed.

Creosote must be colourless, of great refrangibility to blue

and yellow, of specific gravity, 1.037 at 20° Cent.; and its alcoholic solution mixed with barytic water must not change to a brown colour by exposure to air. It commences to boil at 203° Cent., and distils without any alteration. It possesses a very marked odour, which resembles that of smoked meat and castor at the same time. With respect to its general properties, they comport with those of an essential oil. As to the medical virtues of creosote, several physicians at Munich have confirmed its antiputrescent, dessicative and styptic qualities. In the cure of sluggish, cancerous and syphilitic ulcers, of tetter, itch, and caries itself, its employment has been attended with the most happy success.

It is principally employed externally, by friction, either pure or in watery solution. The latter is usually prepared by the addition of one pint of creosote to eighty parts of water. To obtain the water of creosote more concentrated, I first prepared a tincture of one drachm of creosote to two ounces of alcohol, and then added it in drops to the water to obtain the strength required—that is until it began to be opaque. I am convinced that it is an excellent water to arrest the decay of teeth. It is one of the best remedies against pain from carious teeth, applied by means of a camel's hair pencil, either in its pure state, or the alcoholic solution made by one part of creosote to eight or sixteen of alcohol. It is for the above purposes that it is already much employed in Germany.

Its internal use has also been attempted, and M. Reichenbach furnishes many facts of its having been used with great success in the treatment of dysentery. This chemist believes that the respiration of vapours of creosote with air will be attended with very beneficial effects against suppurations, both in the wind pipe and in the bronchial vessels. We learn from the experiments of several physicians of Munich upon dogs, that the action of creosote is entirely local, and that no absorption occurs.

The carotid artery, for instance, has been cut in the middle, and the blood being stopped for a few moments by press-

ing the finger on the wound, whilst a piece of lint wet with creosote was applied; after removing the finger, the artery had ceased to bleed, and the healing of the wound followed in a few days even without a bandage.

Journ. de Pharm.

ART. LXIX.—ON SEVERAL ALKALOID PRINCIPLES, FOUND IN THE SOLANÆ BY GERMAN CHEMISTS.

ATROPINE.

M. BRANDES thought that he had extracted this organic alkali from the ATROPA *belladonna*, but his experiments were not confirmed, and the existence of atropine was still problematical, when the investigations of M. M. Geiger and Hesse appeared on the one part, and those of M. Mein of Neustadt, on the other. The first mentioned chemists obtained this alkali from the extract prepared from the stems and leaves of the belladonna; the latter extracted it from the root, and to M. Mein belongs the honour of first obtaining it in a state of purity. This process, which is the most simple, is as follows:—Twenty-four parts of dry roots of belladonna, obtained from plants of two or three years of age, and which are heavy, and break with a slight resinous lustre, are to be taken; after having been reduced to an extremely fine powder, they are to be digested with 60 parts of alcohol of 86° to 90°; the digestion is to be continued for several days; the mass subjected to pressure, and the residue again heated with the same proportion of alcohol as before. The tinctures being united and filtered, are to be mixed with one part powdered hydrate of lime, and the mixture shaken frequently during twenty-four hours. After having again filtered, to separate the copious deposite that has formed, diluted sulphuric acid is to be added drop by drop, until in slight excess. The sulphate of lime which is precipitated, renders it requisite to again filter the mixture. After this, the alcoholic tincture is

introduced into a retort, and distilled till one half has passed over; to the residue in the retort is to be added six or eight parts of pure water, and the liquid heated in a porcelain capsule, over a very gentle fire till all the alcohol has evaporated. The residue is to be filtered, if necessary, and evaporated to one third.   After cooling, a concentrated solution of potash is to be added, drop by drop, stirring gently, as long as the fluid is turbid, when the mixture is suffered to stand for a few hours.   This last addition is to precipitate a greenish resin, which gives the fluid an irridescent appearance, and militates against the crystallization of the atropine.   If the fluid which contains the sulphate of atropine is sufficiently evaporated, or not too poor in atropine, it generally forms a gelatinous mass a short time after the addition of the carbonate of potash. The mother water is to be carefully decanted, or separated by means of a filter, and a solution of carbonate of potash again added till the fluid is perfectly transparent.

The mixture, when left to itself for twelve or twenty-four hours, often presents at its surface or in its substance, white crystals of atropine.   By shaking, the molecules of the gelatinous mass are much condensed, and set free a large proportion of mother water, which is to be removed as soon as possible by the filter and compression between sheets of blotting paper.

As the atropine, when recently prepared, is still moist and impure, and loses much by being washed with water, it must be dried and then formed into a paste with water, which is to be promptly removed by compression between sheets of paper, and the residue again dried.   This atropine, which is still impure, is to be dissolved in five times its weight of alcohol, the solution filtered, and six or eight times its bulk of pure water added to it.   The fluid becomes milky by this addition, or soon assumes this aspect on the evaporation of the excess of the alcohol; at the end of twelve to twenty-four hours, the atropine will be found deposited in crystals of a bright yellow colour; after having been washed with a few drops of water, they are to be placed on blotting paper and dried.

These crystals are again to be heated in the same way as

above, and will then afford an alkaloid which is almost white, and is regularly crystallized. Twelve ounces of belladonna root only furnished M. Mein with about twenty grains of pure atropine.

Atropine from different parts of the same plant, and by two different modes of operating, manifested to M. Mein, and to M. M. Geiger and Hesse, identical properties, with some unimportant exceptions, differences depending, no doubt, on the greater or lesser state of purity. The principal properties of this alkali are:

When pure it is white, crystallizable in transparent grouped prisms of a silky lustre. It is inodorous, soluble in absolute alcohol and sulphuric ether, and more so when aided by heat. Water, at the usual temperature only dissolves a small portion, $\frac{1}{5.0}$ according to M. M. Geiger and Hesse, and this solution which M. Mein found but slightly bitter, appeared very disagreeably so to the two other experimenters. The solubility in water increases with an increase of temperature; this solution restores the colour of litmus paper, reddened by an acid; even when it is much diluted it very promptly dilates the pupil of the human eye, and this dilatation is very lasting. Atropine is not volatilized at the temperature of boiling water; but, when exposed between two small watch glasses to a more elevated temperature, it first melts, then is transformed into fumes, which restore the colour of litmus paper reddened by an acid, and which, on condensing, cover the upper glass with a varnished crust, this crust has all the properties of atropine. When heated in a spoon over a flame, atropine soon melts, gives out empyreumatic fumes, becomes brown and inflames; it burns with a bright, but somewhat smoky yellow flame, and leaves no residue.

Chlorine produces very little alteration in it, it appears to form definite saline compounds with the acids; the sulphate and acetate may be more readily obtained in a crystalline state than the hydro-chlorate or nitrate. Pure potash precipitates it of a white colour from its saline solutions, as does also caustic ammonia. The aqueous solution of atropine gives an abundant white precipitate on the addition of the

aqueous infusion of galls. It is precipitated of a lemon yellow colour, by the hydrochlorate of gold, and of an isabella colour by the solution of platina.

The manner in which this alkali acts on a slightly acid hydrochlorate of gold, appears characteristic. The lemon yellow precipitate, at the end of a few hours, assumes a crystalline structure, and appears to represent a double saline combination of atropine with hydrochlorate of gold. This observation was made by all three of the experimenters.

Concentrated sulphuric, nitric, and hydrochloric acids, dissolve the crystals of atropine without disengagement of gas; these solutions are colourless. With the aid of heat, sulphuric acid turns of a slight brown, nitric acid assumes a bright yellow tint, and hydrochloric does become changed, at least in minute experiments.

When heated with hydrated potass, atropine gives out abundant ammoniacal fumes.

M. M. Geiger and Hesse have also remarked another remarkable property of atropine; the alteration it undergoes by a continued contact with air and moisture, at ordinary temperatures. It loses its property of crystallizing, the crystals already formed disappear, the fluid assumes a slight yellow tint, and by evaporation an uncrystallizable residue is obtained, soluble in all proportions in water; this altered atropine acquires a nauseous narcotic odour. In other respects, the alteration is not considerable; the alkali is as poisonous as before, and if it be combined with an acid, and the solution treated with animal charcoal, the alkalies precipitate the greater part in a solid form, and this atropine is again susceptible of crystallization.

From the late analysis of M. Leibig atropine is composed of

34	atoms of carbon,
23	hydrogen,
6	oxygen,
1	nitrogen.

HYOSCYAMINE.

Its existence in the HYOSCYAMUS *niger* was also not satisfactorily proved, until the recent researches of M. M. Geiger and Hesse.

The extraction is somewhat difficult on account of its ready solubility in water, or rather its prompt alterability on contact with water and the free alkalies, this alteration renders it soluble in all proportions in water, and even produces some decomposition of it. It is most readily extracted from the seeds; they are to be heated with alcohol, either with or without the addition of an acid, or by hot water; the fluids are to be evaporated by a very gentle heat; they are to be decolourized by treating them several times with lime and sulphuric acid, and filtering; they are to be evaporated, and an excess of pulverized carbonate of soda added; the precipitate is to be deprived, as soon as possible, of the fixed alkali, by subjecting it to pressure and treating it with absolute alcohol, and the mother waters are at the same time to be treated with ether; the alcoholic and etherial solutions are to be mixed together, and lime again added; the mixture is then to be filtered, and the filtered fluid treated with animal charcoal, and finally evaporated by a very gentle fire, adding a little water. If the hyoscyamine is still coloured, it must be again combined with an acid, and treated as above. The product is oftentimes very small.

Pure hyoscyamine slowly crystallizes in colourless transparent needles, having a silky lustre, either grouped or disposed in a radiated form; these crystals are inodorous, but slightly soluble in water, but more so than those of atropine. The least quantity applied to the eye, causes a dilatation of the pupil which lasts for a long time. In the anhydrous state it is not alkaline, (resembling in this respect the other organic alkalies) but the addition of water developes a well marked and persistent alkalescence. When distilled with caution, hyoscyamime volatilizes, and appears to be but slightly altered, for it is as poisonous and alkaline as before. At the same time a portion of it is decomposed in this operation, ammo-

niacal fumes being given off. When it is heated with water, a small portion is also volatilized; for the distilled fluid is slightly alkaline, and dilates the pupil, but the greater portion is not volatilized. When heated with the hydrated fixed alkalies, it is completely decomposed like atropine, giving out ammoniacal fumes. This property establishes an essential difference between these alkalies and nicotine, which, when heated with the hydrated fixed alkalies, is not decomposed, (at least wholly) but volatilizes with the steam, and may thus be obtained by distillation. The aqueous solution of hyoscyamine is thickened by the addition of the tincture of iodine and assumes the colour of kermes mineral. All the organic alkalies hitherto examined present this peculiarity. The precipitate, by tincture of galls is white and abundant; yellowish white with the solution of gold; platina causes none. The salts of hyoscyamine are neutral, they readily crystallize in part, and are as poisonous as hyoscyamine; their aqueous solution acts with the above mentioned reagents, like the alkali itself. Hyoscyamine is very soluble in alcohol and ether.

DATURINE.

M. M. Geiger and Hesse are also the first who have really extracted daturine from the *Datura stramonium*, and described its characters. The seeds of this plant furnish the greatest proportion; the mode of extraction is the same as that for hyoscyamine; it is easier, from the daturine having more tendency to assume the solid form; but the pulverized seeds must always be heated with hot alcohol, otherwise they retain the greater portion of the daturine. This alkali readily crystallizes; it is deposited from its hydro-alcoholic solution in the form of colourless, very brilliant, grouped prisms; it is inodorous, its taste is at first slightly bitter, then very acrid like that of tobacco; it is very poisonous, one-eighth of a grain being sufficient to kill a small bird in three hours; when applied to the eye it occasions a great and permanent dilatation of the pupil.

It is worthy of remark, that M. M. Geiger and Hesse have only recognized this property, in the three organic alkalies of

which we have spoken. Solanine, at least prepared by M. Otto hereafter to be noticed, does not cause it, and nicotine produces the contrary effect.

Daturine in combination with water has a marked alkalescence. When it is cautiously heated it partly volatilizes without alteration, but a portion is destroyed with the same phenomena as with hyoscamine. When heated with water it does not volatilize, when it is subjected to the action of long continued heat, with the hydrated fixed alkalies, it is decomposed, giving out ammoniacal fumes. It is but slightly soluble in water. It requires about 280 parts of this fluid at the ordinary temperature, and 72 at the boiling point; the solution becomes turbid on cooling without the daturine crystallizing, as the same contact with water is not so destructive of it as of atropine and hyoscyamine. By evaporating the aqueous solution, crystals are not obtained at once, but if the mass be moistened, or even if the solution be permitted to evaporate spontaneously, crystals are formed. The aqueous solution of this alkali acts with reagents like that of hyoscyamine; it is also very soluble in alcohol, rather less so in ether. The salts of daturine afford beautiful crystals, which are in general unalterable in the air, and easily soluble. Their action is very poisonous. Their aqueous solution behaves with reagents like that of pure daturine. The inorganic alkalies precipitate this salt in the form of white flakes, when the solution is not too weak.

COLCHICINE.

The same chemists have extracted colchicine from the seeds of the Colchicum *autumnale*, by a process similar to that for daturine. It is rather more difficult to obtain in a pure and colourless state.

Colchicine crystallizes in delicate needles, it is inodorous, of a very bitter taste, at first and afterwards tart, but has not the acrimony of veratrine; when applied to the nostrils it does not occasion sneezing, whilst the least portion of veratrine induces the most violent sternutation. In a hydrated form, colchicine has but little alkalescence, nevertheless it completely neutralizes the acids, and forms with them (which

is not the case with veratrine) salts which are partly crystallizable, whose taste is bitter and tart. This alkali is soluble in water, whilst veratrine is insoluble. This solution precipitates that of platina. The action of concentrated nitric acid on colchicine is characteristic; this acid gives it a deep violet or indigo blue colour, which soon passes to green and yellow. Concentrated sulphuric acid colours it of a yellow brown; veratrine, as is well known, becomes first red, and then yellow by the action of nitric acid, and with sulphuric acid, first yellow, then blood red, and finally of a beautiful violet.

Colchicine is very poisonous; one-tenth of a grain dissolved in diluted alcohol was given to a kitten of eight weeks old; it immediately caused frothing at the mouth, and in an hour, copious liquid alvine evacuations, followed by vomiting. The animal staggered, fell, rolled from side to side, uttering plaintive cries, and appeared convulsed. These symptoms gradually increased, and finally death took place in twelve hours. On opening the body, the stomach and intestines were found violently inflamed, with an effusion of blood throughout.

ACONITINE.

In 1832, M. Geiger published some physiological experiments made with the aconites, from which he concluded, that in the acrid aconites there was, besides the readily destroyed acrid principle, another which was narcotic and widely dissimilar, as the leaves of the A. *napellus*, even when gathered when old, and having no acrid taste, had a very energetic narcotic power. The researches of M. Hesse confirm this conclusion. This chemist obtained aconite from dried leaves of the A. *napellus*, by much the same process as that used to obtain atropine from the roots of the belladonna. Aconitine does not seem susceptible of crystallization; in a pure state it is white, granular or in the form of a transparent, colourless mass, having the lustre of glass, and inalterable in the air; it is inodorous, its taste is bitter, and then acrid, but this acrimony is neither powerful nor permanent, very different from that of the plant, which often lasts for twelve hours or more, and leaves the tongue benumbed; the acrid principle

is intimately united to the impure aconitine, but by several times combining this alkali with an acid, and decomposing the solution, the acrimony is gradually removed. When wholly deprived of this principle, aconitine is highly poisonous; one-fiftieth of a grain dissolved in a little diluted alcohol being sufficient to destroy a small bird in a few minutes; and one-tenth of a grain acted with the rapidity of lightning. It is readily fusible, but not volatile; it gives out ammonical fumes on dry distillation; is but slightly soluble in water, but very soluble in alcohol or ether. The solutions are alkaline; the aqueous solution is not precipitated by the solution of platina. Nitric acid dissolves aconitine without producing any colour; sulphuric acid first colours it yellow, and then of a dirty purplish red. Aconitine completely neutralizes the acids, the resulting salts appear to be uncrystallizable.

ORGANIC ALKALIES.

M. Geiger observes that the organic alkalies may be divided into *volatile* and *fixed;* but this classification is only relative. The volatile organic alkalies are those which are volatilized at the ordinary temperature. In their greatest state of purity they are liquid, and are always distinguished by a peculiar odour. Those which are not volatile at the ordinary temperature, are solid, inalterable in the air, and inodorous when pure. But some, derived from the SOLANÆ, easily contract a nauseous, narcotic smell. Hyoscyamine forms, as it were, the link between the volatile and fixed organic alkalies.

In a physiological point of view, these bodies may be divided into poisonous and not poisonous. The volatile organic alkalies are all acrid and poisonous. Among those which are fixed, atropine, hyoscyamine, daturine, colchinine, aconitine, delphinine and emetine, are acrid, or bitter and poisonous. Morphine, strychnine and brucine, are bitter, narcotic and poisonous. Quinine and cinchonine belong to the bitter organic alkalies, which are not poisonous.

In a chemical point of view, it is worthy of remark, that

all the organic bases contain azote, and in all those hitherto examined, the remarkable law discovered by M. Liebig, that the proportion of azote gives the measure of their capacity for saturation, has been confirmed. Thus one atom of an organic alkali always contains exactly one atom of azote.

All the crystallizable substances, whether poisonous or not, but having some other energetic action, and which resemble organic saline bases, do not belong, on this account to this class of bodies. A great number of these substances which are regarded as such, are not so, and many have no azote. They present in general, in a physiological point of view, a great resemblance with organic bases; thus we know picrotoxine, whose poisonous action is strongly marked, colombine and lactucarium, the analysis of which has not been made. These substances arrange themselves near strychnine, brucine, and the narcotic principles of opium. Elatine, which is a very energetic drastic, colycynthine, bryonine and digitaline, present much analogy in their effects with veratrine, colchicine and emetine. Salicine, gentianine, and other crystallizable, unazotized, bitter principles, have an action similar to that of quinine and cinchonine. At the same time there is a marked line of distinction, for the azotized bases enjoy an action much more energetic than the unazotized neutral principles.

Alimentary substances give rise to an analogous remark, for we know that those which are azotized are much more nourishing than those which are not so.

Journ. de Pharm.

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ART. LXX.—EXTRACTS FROM THE BULLETIN OF THERAPEU-
TICS. By M. O. Henry. Translated for the Journal of Pharmacy, by
Charles Ellis.

In the last numbers of the Journal of Therapeutics, of
which the utility and success are every day better appre-
ciated, we have met with the following articles, which we
would point out as particularly calculated to interest our
readers.

THE USE OF TAR AND SOOT IN CERTAIN AFFECTIONS.

Since the discovery of creosote, recourse has been had to
the use of many substances where this matter is known to
or may possibly exist.

Thus tar first gave to M. Duchesne Duparc the idea of re-
verting to an application, thought so efficacious by the Egyp-
tians and the inhabitants of Holstein, in the cure of itch.
Various trials led to perceive the advantages it offered in the
treatment of this disease, as well from the rapidity and effi-
cacy of its influence, as from its low price, which placed it
in the power of the most indigent; a class almost exclusively
affected with this malady.

M. Duparc found that a cerate made with ℥ij of tar to an
ounce of grease, and employed by friction upon the part af-
fected with itch, caused the eruptions to disappear rapidly,
and produced a speedy cure. He treated a great number of
patients, and by comparison with other modes of practice,
was led to the conclusion that the use of this cerate in suit-
able quantities, (half an ounce in two frictions, morning and
evening, combined with the sulphur or alkaline bath, every
day,) would constantly effect a cure in ten days, whilst fifteen
to twenty were required by other modes of practice.

Soot is also highly spoken of as a succedaneum for creo-
sote against inveterate tetter or ringworm, scald-head, ulcers
of a bad character, &c. The decoction made by boiling two
handfuls of soot to a pint of water for half an hour, and
strained with expression, is at first used as a lotion. This
wash is applied to the ulcers, three or four times daily, and

with the aid of cataplasms causes the scabs to fall off; pledgets of lint wet with it are also used as constant fomentations. For inveterate fistula it is applied in the form of injection. Occasional friction with the following cerate may be applied in the intervals:

Axungia	℥ij
Soot	ʒij M.

M. Caron Duvillard has also used soot with great advantage in some affections of the eyes. Sometimes by snuffing it pure or combined with sugar candy, and sometimes in the form of a cerate made with butter, which in no respect is inferior to that of Désault.

He suggests the following collyrium, which he as well as M. Baudeloque have used with success in scrophulous opthalmia, viz.: soot ʒij dissolved in boiling water, filtered and evaporated to dryness. The dry and shining residuum is afterwards dissolved in strong vinegar by the aid of heat, and twenty-four grains of extract of provence roses added to twelve ounces of the liquid. A few drops of this liquid in a glass of water form the collyrium. Finally, to dissipate the nebula of the cornea of the eye, the same physician advises the use of the following tincture:

Opium	ʒij
Cloves	ʒij
Washed soot	ʒiv
Cinnamon water	℥viij
Alcohol	℥iv

mix, digest for five days, strain and filter.

In applying it, touch the granulations of the cornea with a fine pencil wet with this liquor.

MANNITE.

Mannite, the crystallizable principle of manna, has already been the subject of many experiments, with the view of supplying the place of the latter, of which the nauseous bitter taste is very disagreeable to those who take it; but the results have not been very satisfactory.

Recently, however, mannite has been successfully administered by M. Martin Solon, in the dose of one to two ounces dissolved in from two to four ounces of boiling water, combined with some aromatic. He believes that the fresh agreeable taste of this purgative will offer great advantages in its use, if these effects are confirmed by new experiments, for this substance does not appear to produce irritation upon the intestinal canal. Since the labours of M. Payen have shown the existence of mannite in the root of the celery plant, in the proportion of six or seven per cent. and of easy extraction, [see page 310, for process,] it is hoped that this organic principle will become an object of interest to isolate, and of importance in therapeutical application.

PREPARATIONS OF COLCHICUM.

The bulbs, and sometimes the seeds of colchicum (*Colchicum autumnale*) constitute the base of several medicinal compounds, which possess sufficient energy to claim the particular attention of those who use them.

It is known that these bulbs, with alcohol (two parts of fresh bulb to four of alcohol of **36°**) form the Eau Medicinal de Husson, so celebrated for many years. Unfortunately the published recipes for the preparations of colchicum wine, oxymel, &c. either of the old or new codex, or of different formularies, are very unlike, which renders the use of these compounds uncertain and very variable ; further the bulbs of colchicum are very liable to vary in their properties according to the season when they are gathered. It is difficult to state the precise time of the year when they should be collected, except that it is about the month of August when the bulb is in full vigour.

In searching into the last works of M. M. Geiger and Hesse, who attribute the active principle of colchicum to a crystallizable matter somewhat different from veratrine, which they have named colchicine, we might without doubt, at least under these circumstances, be tempted to substitute for the preparation of colchicum, determinate quantities of this organic principle (whenever its medical properties shall have been

fully tested) combined or not with some gummy substance capable of imitating those which accompany it in the vegetable.

We certainly adopt in most instances the judicious opinions of M. Polydore Boullay, upon the danger of changing pharmaceutical formulæ, and these opinions are directed by too much good sense not to be generally appreciated ; but we believe also that the employment of certain active principles, isolated from active plants, would be attended with great advantage, for generally they represent the most decided properties of the substances from which they are extracted, and it is easy to modify or weaken their effects by a combination with other ingredients.   All are, at least, certain of operating with precise quantities, and with mixtures identical in their composition, which cannot always be the case, not only with those of colchicum, but many other roots, barks, seeds, &c. of which the composition or strength may vary according to the time when they are gathered, the season, or even the culpable adulterations of commerce, which are not always perceived.   Finally, the facility of administering them is greatly increased, by concentrating in a small volume the active principles which constitute the base of a pharmaceutic compound.

UPON THE USE OF CODFISH OIL.

The oil of the liver of codfish (*oleum jecoris aselli*) formerly employed in medicine in certain countries has been again introduced into practice with great success in many affections of chronic rheumatism, and also as a vermifuge against the lombrice and ascarides.

This oil is obtained by three modes, which furnish products more or less pure. The first consists in exposing to the sun's rays, the livers of codfish piled up in tubs. A yellowish liquid flows from them (white limpid oil of codfish,) destined for internal use. After the livers have remained for some time they undergo a kind of putrefaction, and furnish a second product, *brown limpid oil*. Finally, by heating them in a cast

iron pot, a third oily liquid, still more coloured and viscous, is obtained.

The *oil of codfish* is administered internally either pure, or which is a better mode, combined with the fourth of a glass of emulsion—the dose for adults being two or three table-spoonfuls a day, and for children two or three tea-spoonfuls.

Externally, it is used by friction, either pure or combined with ether or ammonia. For the destruction of the lumbrici and ascarides it must also be used in the form of injection.

M. Caron du Villars, author of this article, announces that this medicine, which he considers as very valuable, although an unpleasant one, has never produced any alteration in the digestive functions, even when it has been given in very considerable doses.

Journ. de Pharm.

ART. LXXI.—REMARKS ON PROFESSOR MITCHELL'S METHOD OF PREPARING CARBONIC OXIDE, FREE FROM CARBONIC ACID. By L. D. GALE, M. D. Acting Professor of Chemistry in the University of the City of New York, and Professor of Chemistry in the New York College of Pharmacy.

HAVING received No. 2 of vol. xxv. of this Journal, [Amer. Journ. Science and Arts,] containing Professor Mitchell's paper on a new process for preparing carbonic oxide, about the time I was to lecture on that subject before my class in the College of Pharmacy, I adopted Professor M.'s plan and followed his directions as nearly as possible, but much to my discomfiture found the gas obtained was perfectly incombustible: but I should here state that it was used immediately after preparation. As gases will sometimes burn from a large orifice, when they will not from a smaller one, I varied the size of the aperture, but all to no purpose. I then collected more gas, with "heat duly moderated," and preserved only the first and last portions, but did not succeed in causing it to burn from an orifice. I then threw up, by means of a syringe, some caustic potash into the receiver containing the gas; a

rapid absorption took place, amounting to nearly half the original quantity, and the remainder was sufficiently pure carbonic oxide. I also ascertained, that if the gas, when procured, be allowed to stand over cold water, and especially in broad and shallow receivers, for two or three hours, so much of the carbonic acid is absorbed that the remaining gas will burn with its ordinary appearance. The same remark will apply to carbonic oxide, prepared by any of the ordinary methods described in the books. Indeed, I am constantly in the habit of preparing the gas in the morning, when it is to be used in the afternoon, and thus avoid the occasion of using any alkali.

Although from the above experiments I was quite satisfied that carbonic acid is always produced in the above mentioned experiments, yet, that I might be able to speak with perfect confidence, I was induced to make a complete analysis of the gas obtained after Dr. Mitchell's plan. Taking a given weight of the oxalate of ammonia, and the proportion directed of sulphuric acid, I collected the whole gas evolved from the materials over mercury, that none should be absorbed during the operation. One hundred equal parts having been set aside for examination, pure liquid potassa was thrown up by means of a syringe, and the vessel agitated until no more absorption took place, when fifty parts of the gas had disappeared. The residual gas, on being detonated with oxygen, was found to be nearly pure carbonic oxide. In order to ascertain whether the gas differed in its qualities, at different stages of the process, I collected portions of it at regular intervals, throughout the operation, and subjected them to careful examination. The result of these experiments was pretty uniform, not varying in any case two per cent. from fifty measures of each gas; and hence I infer, that the oxalate of ammonia, treated as above, for obtaining carbonic oxide, yields the same products as the binoxalate of potassa or oxalic acid, treated according to the methods described in the books.

Professor Mitchell states, that " on examining the residuary matter left in the retort, it is found to be strong sulphuric

acid." I must confess, I am at a loss to know in what way he made the examination, to arrive at such a conclusion, unless it be that he used more than " one or two drachms of sulphuric acid," for in each case in which I examined the residue, where an ounce of the oxalate and two drachms of acid were used, I found crystals in the retort, after the materials had cooled, answering in every respect to the acid sulphate of ammonia. If the quantity of sulphuric acid be increased to four or five drachms, and the heat be stopped a little before the gas ceases to come over, the acid will then hold the sulphate in solution and exhibit to the eye an appearance of sulphuric acid; but a single and very simple experiment—namely, the evaporation of a few drops of the liquid on a platinum or glass capsule, until a part of the acid is expelled, will indicate the presence of some salt, and that, on examination, will be found as above mentioned. That ammonia should escape from the retort, in a free state, while it is in contact with a large excess of free sulphuric acid, and then combine with the carbonic acid resulting from the decomposition of the oxalic acid, appears to me unphilosophical, and is disproved by experiment, for we recover the whole, or very nearly all the ammonia in combination with sulphuric acid.

American Journal of Science and Arts.

ART. LXXII.—ANALYSIS OF COCCULUS INDICUS.

By M. M. Pelletier and Couerbe.

According to these chemists, the substance of this fruit contains only one crystallizable principle, whilst its envelopes contain three new substances, one of which is neutral, and capable of regular crystallization, and one which also can be obtained in a crystalline form, and has an organic base.

Analysis of the substance of the fruit.—The products recognized in this were: 1. Picrotoxine. 2. A Resin. 3. Gum. 4. An acid fatty matter. 5. An odorous substance. 6. Ma-

lic Acid. 7. Mucus. 8. Starch. 9. Woody fibre. 10. Malate of lime. 11. Inorganic salts (nitrate of potassa, sulphate of potassa, chloride of potassium) *by incineration*, carbonates of potassa and lime, manganese, and iron.

The fruit was successively treated with ether, boiling alcohol, cold water, and boiling water. These menstrua were used in succession, and their action on the fruit continued until every thing soluble in them was taken up. The etherial solution afforded the picrotoxine, the fatty matter, and the yellow colouring principle.

Analysis of the envelopes or shells. These were reduced to powder, and exhausted by boiling alcohol, which on cooling, deposited wax.

The alcoholic extract, whilst in solution, gave it a brown colour; on evaporation it assumed an unctuous appearance, and had a sweetish bitter taste. Cold water took up from it a brown substance which was sensibly acid. It was next heated with slightly acidulated boiling water. The brownish fluid thus obtained gave abundant precipitates with the alkalies. That by ammonia was carefully collected, and designated as the *brown alkaline precipitate.* The alcoholic extract after this treatment, which had reduced it to a very small bulk, was treated with ether. The tincture thus made was mixed with a small quantity of water and distilled, to obtain the ether. The residuum consisted of a fluid on which a certain quantity of fatty substance was floating. The aqueous fluid had a marked smell and taste of myrrh, it was slightly milky. When evaporated to dryness it afforded an *acid, brown substance* having the appearance of a resin, and coloured in spots by chlorophylline; this substance they called menispermic acid.

Menispermic acid.—White, insoluble in boiling water, or in ether, soluble in the alkalies, precipitable from its solution by the mineral acids; uncrystallizable, presenting the appearance

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of an amorphous mass which softens in boiling water.   The
mean of three analyses gave:

Carbon,	64.14
Hydrogen,	6.09
Oxygen,	29.17.

A composition differing very little from that of picrotoxine.

Brown alkaline precipitate.—Colour owing to a black mat-
ter, the greater part of which can be separated by water
acidulated with weak acetic acid.   This acid redissolves the
precipitate with the exception of the black matter, and a little
phosphate of lime.   By a second precipitation by means of
ammonia, the alkaloid principle is obtained in the form of a
grayish yellow, resinous mass.   Left in contact with water
from which it had been precipitated it becomes pulverulent.
Dried, redissolved in alcohol, and subjected to spontaneous
evaporation, it affords three very distinct substances : 1. One
having a green yellow colour, a resinous aspect, and of an
alkaline nature.   2. The second crystallized in beautiful pris-
matic needles. 3. The third having the appearance of a fawn
coloured mucilage.

The crystals of number 2, were found implanted in this
last.   The yellow matter, which was the most abundant, en-
veloped the whole mass.   Those three substances were sepa-
rated; the resin, by cold alcohol, the alkaline crystalline
principle by ether, whilst the mucilaginous substance was
taken up by absolute alcohol.   When evaporated at 45° C. it
was obtained in a crystalline form.

The first substance, which could not be deprived of colour
or crystallized, was named the *yellow alkaline substance.*   It
appeared to bear the same relation to the crystallized alkaline
principle, as those alkaline substances met with in the mother
waters from which strychnine, quinine, morphine, &c. do to
these principles.   These resinous substances are soluble in
acids, precipitable by alkalies, and can never be obtained in
a crystallized state, nor in an alkaline nor neutral condition ;

they differ from the alkalies peculiar to each vegetable, and are, perhaps, alterations of them. The discoverers gave the name of *menispermine*, to this substance, and that of *para*-menispermine to the second, as it presented a similar composition to the first, with which it is isomerous.

Menispermine.—White, opaque, crystallizing in four sided prisms, insipid, appearing to have no marked action on the animal economy; fusible at 120°, decomposed at a higher temperature, leaving a voluminous coal; insoluble in water, soluble in alcohol and ether, which on evaporation afford it in a crystalline form. The acids, when more or less diluted with water, dissolve it, from which solutions the alkalies precipitate it without alteration. Concentrated sulphuric acid appears to have but little action on menispermine, and does not strike it a red colour with it; when hot it dissolves it; the solution is precipitated by diluted ammonia. Concentrated nitric acid also has but little action on this substance, when cold, when aided by heat, however, it converts it into a resinoid yellow matter, and into oxalic acid. The neutral sulphate of menispermine crystallizes in prismatic needles.

Para-menispermine. Solid, crystallized in four sided prisms having a rhombic base, generally grouped in small radiated masses, resembling stars; subliming without alteration, not sensibly soluble in water; somewhat so in ether, wholly so in absolute alcohol. The mineral acids at 14° C. have very little action on para-menispermine; when hot, they decompose it, when diluted with water they dissolve it, but do not become saturated.

Composition.—The plan followed in the examination was that of Gay-Lussac, the mean of these analyses gave:

Carbon,	71.80
Nitrogen,	9.57
Hydrogen,	8.01
Oxygen,	10.53

Which gives the following formula $(C^9 \, N^1 \, H^1 \, O^1) \times 2$. But by admitting two atoms of nitrogen in the alkaloid, to preserve the analogy between this and the other alkaloids, this atomic composition reduced to centimes, gives nearly the numbers found by experiment.

C^{18}	$=$	13.75.884	$=$	72.31
N^2	$=$	177.038	$=$	9.31
H^{24}	$=$	149.760	$=$	7.87
O^2	$=$	200.000	$=$	10.52

Here then are two substances having the same composition, which are endowed with very different physical and chemical properties; one is alkaline, saturates acids, and forms crystalline compounds, the other is not alkaline, does not saturate acids, and is volatile.

Journ. de Chim. Med.

ART. LXXIII.—OBSERVATIONS ON THE ACTION OF BROMINE on different vegetable alkaloids, as Quinine, Cinchonine, Morphine, Salicine, Strychnine &c., comparatively with that of Iodine on the same alkaloids.

By M. D. Blengini, of Turin.

Bromine had scarcely been discovered, when chemists applied themselves to an investigation of its properties, as well as of its action on other bodies, both simple and compound. Although these investigations have developed many relations of this new body, I made some experiments to ascertain the influence it exerts on germination and vegetation. These experiments are recorded in the *Calendrier Georgique*, for 1833.

Although it is now well known that bromine, like iodine or chlorine, when brought in contact with a solution of potash and soda, gives rise to a decomposition of the water, and a formation of a hydro-bromate of potash and soda, the manner in which it acts on the vegetable alkaloids remains to be

ascertained. These alkaloids, although endowed with alkaline characters, are very different in their nature from potash and soda. These considerations induced me to investigate the action of bromine, on quinine, cinchonine, morphine, strychnine and salicine.

After having prepared a solution of quinine with diluted alcohol, I poured a few drops of bromine into it, the solution became turbid, and of a red colour, after a short reaction aided by heat, the colour disappeared, and a turbid and somewhat opaline solution was the result, which after standing afforded a somewhat coloured precipitate, soluble in alcohol.

The clear liquid, subjected to evaporation, gave rise, as it became concentrated, to a disengagement of white fumes, which quickly reddened litmus paper. The liquid was acid, bitter, reddened litmus paper, and became of a brown colour; on cooling, it deposited small crystals, of a form which it is difficult to describe. After having separated the mother water, and having again subjected it to evaporation, it again afforded white acid fumes, resembling hydro-bromic acid, the liquid residue became of an obscure colour, and on cooling gave rise to small crystals, still more complex than the preceding.

I dissolved the first crystals obtained in pure water, and treated the solution with nitrate of silver, a yellowish white precipitate was immediately formed, which when exposed to the light soon became brown, but not as much so as chloride of silver. The same solution, heated with liquid ammonia, gave a white precipitate, formed of quinine. Having introduced a portion of this same solution in a V shaped tube, and established a communication by means of two platina wires with the two poles of a voltaic pile, a liquid of a red colour manifested itself at the positive pole, and along the platina wire; there was no sensible disengagement of gas; this fluid, on examination, proved to be bromine; at the negative pole there was a disengagement of much hydrogen gas. The same solution heated with a little nitric acid, became of a brown red colour, and when heated gave out red fumes, having the smell of bromine.

The second crystals, heated like the first, presented the same results.

Cinchonine, morphine and strychnine, treated in the same manner, gave analogous results, with this difference only, that the crystals obtained by the reaction of the bromine with cinchonine were more distinct, assuming a needle like appearance. Moreover, the solution obtained in this case, gave out acid fumes, but they were of a red colour, without becoming brown, as was the case with quinine.

The saline matters obtained, treated with nitrate of silver, with pure ammonia, with nitric acid, and subjected to the action of the voltaic pile, acted exactly similar to those obtained with quinine and bromine.

Salicine also presented analogous phenomena, when acted on by bromine, but, during the evaporation of the solution and the disengagement of white, acid fumes, the porcelain capsule in which it was contained exhibited a circle of a beautiful red colour. On cooling, I obtained a saline substance, soluble for the most part in water, and its solution treated with nitrate of silver &c., and the voltaic pile exhibited the same phenomena as above.

After these experiments, I investigated the phenomena which the same vegetable alkaloids presented when acted on by a solution of iodine in very diluted alcohol. Scarcely was the solution of iodine poured on these alkaloids, when a very vivid red colour was manifested, and after a short reaction, aided by heat, the red colour disappeared, and I obtained a turbid and somewhat opaline solution, which, after standing afforded a dirty white precipitate.

After having concentrated the solution in a porcelain capsule, I obtained, on cooling, a white saline substance.

Strychnine and salicine afforded beautiful needle like crystals; quinine, cinchonine and morphine, gave much more confused crystals. The saline matters were separated from the mother water and dissolved in pure water. I treated these solutions as follows:

1st. Nitrate of silver gave me a dirty white precipitate, almost unalterable by light, and insoluble in ammonia.

2d. With nitric acid, these solutions became of a reddish white colour, and when heated, there was a disengagement of the violet fumes of iodine.

3d. On mixing these solutions with a solution of starch, I observed no change, but on the addition of a drop of nitric acid, there was an immediate precipitation of a blue ioduret of starch.

4th. Having introduced these solutions into a tube bent in the form of a V, and having subjected them to the action of a voltaic pile, I observed, as in the case of bromine, a red substance at the positive pole, without disengagement of gas; and at the negative pole, a disengagement of hydrogen with a precipitation of a whitish substance. I repeated the same experiment, in adding to the same solutions a solution of starch, and soon observed, both at the positive pole and along the wire, the beautiful blue colour of the ioduret of starch.

5th. In treating the solutions obtained by the reaction of iodine with quinine, cinchonine, morphine and strychnine, with pure liquid ammonia, I obtained precipitates of these bases of a pure white colour.

From these facts, I think that I may conclude :—

1st. That bromine, in acting on quinine, cinchonine, morphine, strychnine and salicine, with the aid of water, this latter is decomposed, and gives rise to a formation of a hydrobromate of those bases, without altering them, provided the action of the heat used be not too violent, or of too long duration.

2d. That this action of bromine on the vegetable alkaloids is analogous to that which it exercises on potash and soda ; for it is likely, without, however, the fact being verified in the series of experiments I instituted, that besides a hydrobromate that there is also a formation of a bromate of these alkaloids.

3d. That iodine acts on these vegetable alkaloids in a manner analogous to bromine.

4th. Finally, knowing the action of bromine and iodine on these alkaloids, the hydro-bromates and hydro-iodates of these bases may be thus prepared.

Journ. de Chim. Med.

ART. LXXIV.—ON THE EXTRACT OF HELLEBORE OF BACHER.

By M. Soubeiran.

M. M. Henry and Guibourt published, some years since, some observations on Bacher's pills. After having compared the various formulæ proposed for this preparation, they gave the preference to the original recipe of Bacher, with some modifications. This preference, at least as regards the formula of the Codex, does not appear to me to be well founded, but as it has some specious arguments in its favour, it will be no doubt adopted by many, who, without further examination, will receive with confidence the opinion of these eminent pharmaceutists.

I will first speak of the formula of Bacher, and that adopted by M. M. Henry and Guibourt, which scarcely differ from each other. These latter have fixed the dose of the vehicle in which it ought to be given. They have also suppressed the first affusion of boiling water, and the re-solution of the extract in the water, manipulations recommended by Bacher, and which it would be as difficult for us, in the present state of our knowledge as respects the composition of hellebore, to point out the advantages as to demonstrate the inutility.

To enable our readers to follow the comparison more readily, between the modified formula of Bacher and that of the Codex, I will commence by giving each:

	Codex.	Bacher.
Black hellebore,	500 grammes,	500 grammes.
Carbonate of potash,	125 "	125 "
Brandy,	2000 "	1225 "
White wine,	2 litres,	6 litres.

It is seen that the principal elements, namely, the hellebore

and alkali are in the same quantities in both formulæ, and that the difference exists in the proportions of the vehicles. Whether the proportion of brandy be more or less, is doubtless of no moment, provided it is sufficient to exhaust the root, since none of it remains when the extract is made. But with the wine the case is different, as its fixed parts are added to the extracted mass and augment its weight, consequently diminishing in an equal ratio the proportions of the active principles furnished by the hellebore. This is very evident when we examine the following comparative results, obtained in operating by each of these plans. It may be useful to add, that the same root and the same wine were used in each case, as the quantity of the products might change by the employment of another root of hellebore, and a wine differently charged with tartar and colouring matter; but it is very evident that if the relation between the two extracts is found different, that the general result must be the same.

Five hundred grammes of the root of black hellebore, treated by the formulæ of Bacher and the Codex, gave:

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Extract of the Codex,   264 grammes,

     Henry and Guibourt,   346   do.

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Not to lose the quantity of vinous fluid which remained in the marc, it was in each case displaced by water, and added to the solutions during their evaporation.

The great difference in the weights of these extracts evidently depends on the quantity of matter furnished by the wine. In fact, the formula of the Codex calls for two litres of wine, and that of Bacher for six. The wine used left 21 grammes of extract per litre on evaporation. The weight of the extract of hellebore was therefore augmented 42 grammes in the formula of the Codex, and 126 grammes in that of Bacher. Now, if we subtract these quantities from their respective extracts, we find

<div style="margin-left:2em">

Formula of the Codex,   222 grammes of extract.

     Henry and Guibourt, 220   do.

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Hence it is evident that the difference between the two extracts is, in fact, owing to the proportion of foreign matters furnished by the wine to each.

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One part of the extract of the Codex represents 1.89, or nearly two parts of the root, whilst the same quantity of extract by the method of Bacher only represents 1.44 parts of the root, or almost a quarter less. It therefore results, that the practitioner who administers one grain of the extract of the codex, employs the soluble portion of two parts of the root, whilst his patient will only take ¾ of a grain, if the formula of Bacher modified by M. M. Henry and Guibourt be used in its preparation.

I am ignorant as to the motives that induced the authors of the codex to adopt the formula they prescribe. Perhaps they were wrong in changing the original formula of Bacher, for except from absolute necessity, old formulæ consecrated by usage, should not be altered; but now that the formula has been changed, and has come into general use, it is certainly not an improvement to recur to the ancient one.

The extract of Bacher, according to the formula of the codex, contains more of the alkaline carbonate, and might appear to be more deliquescent; that of M. M. Henry and Guibourt is less alkaline, but is not less deliquescent, as it contains more acetate of potash than the former.

Journ. de Pharm.

ART. LXXV.—ON THE TRUE ORIGIN OF AMBER.

By Guiseppe Alessi.

(Extract.)

The origin of amber has for a long time occupied the attention of naturalists, and of all who desire to investigate the secrets of nature, and who endeavour to ascertain the true source of her productions. Nevertheless, Klaproth and Wolf, and more particularly Ferrara, in his researches on Sicilian amber, confess that, to the shame of science, we still are far from having any positive information as to the formation of amber.

M. Alessi thinks he has ascertained this, and after giving the opinions of the ancients, goes on to say that, " In the centre of Sicily is found the ancient city of Enna, in Castro Giovanni, with its vast fertile plains, of which it forms the centre; not far distant from it is the ancient fief of Fico. Here is a high hill, covered with wood on its lower part; opposite this are other hills forming a kind of amphitheatre. The lower portions are sandy, but after ascending a short distance, clay mixed with calcareous substances, sand and vegetable soil, occurs. On its surface, and to some depth, are found a heterogeneous mixture, of pieces of alabaster, gypsum, slate, iron pyrites, ferruginous clay, some vitreous lava, and also fragments of amber. Clay slate also occurs but at a greater depth. At about four hundred paces from the hill, flows a branch of the Moselle, a river which arising among the higher grounds falls into the Salso. It is evident that the formation just spoken of, owes its origin to some recent causes."

In the sandy soil at the base of the hill, is a stratum of sandstone, which is not very compact, covered with an abundant efflorescence of hydro-chlorate of soda, and just below this is a rivulet, the water of which is impregnated with soda and sulphur. Its colour is whitish, its odour is disagreeable and its taste salt.

" There," continues the author, " my brother Antonio thought he discovered a mine of salt and sulphur; he penetrated through the mass of rock, and at twenty feet horizontally, he found in a formation of clay mixed with sulphur and some fragments of sulphuret of iron, a sort of fossil tree, which was broken in raising it. Some pieces of both the trunk and the branches were collected, these presented a translucent, odoriferous gum, resembling amber; we also collected some fine powder and fragments of bitumen from other parts of the tree, for the purpose of comparison and analysis."

Some broken branches of five or six inches in diameter were split in various directions, and had more the appearance of peat than of lignite. They all resembled an extinguished coal. Others presented the fibrous part covered with clay,

and in the longitudinal fissures was a slight efflorescence of sulphur, sensible both to the sight and the taste. Two other and more compact fragments were formed of concentric, cracked layers, which, when detached, brought in view a sort of resin, which had evidently exuded from the wood, in the form of mammillary drops or stalactites; they were more or less yellow or red, as was the powder spoken of above.

M. Alessi, after having recognized all the external physical characters of amber in this product, namely : a clear, or lemon yellow colour, sometimes verging on orange, an odour analogous to that of the resin of the pine, and also the peculiar bituminous smell of amber, which was predominant, subjected it to analysis.

Compared with the amber of commerce, that of Fico possessed all the proper characteristics. It only differed in its specific gravity, which was 0.009 whilst that of commerce is 1.078.

The new amber gave unequivocal evidences of its electric properties, attracting straws, &c.; when exposed to a flame it burnt in the same manner as its congener, exhaling a penetrating but agreeable odour.

When reduced to powder and digested in alcohol, it afforded a tincture which had all the properties of that of amber, as the colour, the peculiar smell, and the somewhat astringent taste. By means of a gentle heat it was soluble in the volatile oils of lavender and turpentine, and in the fixed oils, as boiled linseed, the amber of commerce required a higher degree of heat to be acted on by these substances. Finally, the amber of Fico, introduced into a retort, and heat applied, swelled and melted, filling the apparatus with white fumes. When these disappeared, the arch and neck of the retort were found lined with globules of water, traversed by striæ of a brownish oil, and small silky crystals scarcely visible to the naked eye, but readily perceptible with a microscope. When the apparatus was taken apart, there was a strong smell of oil of amber. A little distilled water introduced into the vessel to wash off what adhered to the sides, assumed the colour

and odour of oil of amber. It reddened litmus paper. The residue was diaphanous, brown, friable, of a vitreous aspect, and dissolved in the oils above mentioned. When burnt, it furnished a brittle charcoal, which afforded reddish ashes. This latter changed vegetable blues to green; the hydrocyanate of potash showed the presence of iron, and the oxalate of ammonia demonstrated that of the salts of lime, whilst the hydro-chlorate of platina gave proof of traces of potash.

Returning to the nature of amber, the author gives it as his opinion, that amber is not merely a vegetable production as was stated by Pliny, but this exudation must also be mineralized; undergoing the action of causes unknown to us, it is gradually changed into amber.

As to the species of tree to which it owes its origin, the author is unable to determine. Pliny has attributed it to one of the pines. Geronimo Recupero, who made many researches on this subject, found three larvæ of the phalena of the pine in a fragment of amber. He also possessed another fragment containing a small branch of pine which had borne flowers. This confirms the observations of chemists, cited by Martius, that they had obtained a substance resembling yellow amber, from the resin of the fir. Now, the powder found by M. Alessi still retained the odour of resin, an odour not possessed by amber, as it has probably been dissipated, and the author states that this was the case with the amber of Fico. Pliny has said of amber *pineus in atrittie odor.* When the wood from which the amber had transuded was burnt, it had the smell and flame of pine. The structure, bark, the resin attached to it all had a close resemblance to the branches of the PINUS *sylvestris*, a native of Sicily, where they are used by the inhabitants for torches, under the Latin name of *tæda.* Although the P. *sylvestris* affords but little resin, the P. *abies* furnishes a great quantity of the fluid turpentine which might be mineralized. This would explain the origin of the large pieces of amber which are sometimes found, and contain various species of insects.

To conclude, M. Alessi thinks that it is evident, that amber owes its origin to a species of pine or analogous tree, and

that this resin exudes or distils from its bark. He supposes that united to, or detached from the wood, it might be mineralized ; as it is often found with lignite, and almost always between what was the bark and *liber.* Fluid in the first instance, it gradually became concrete, hence the foreign substances found in it.

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Journ. de Pharm.

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ART. LXXVI.—ON KERMES MINERAL.

By Justus Liebig.

M. Liebig has just published a long memoir on the kermes mineral. The results he has obtained are the following :

The officinal kermes is not formed or deposited from solutions, except these contain oxide of antimony, or where the oxide is formed at the expense of alkaline oxides.

Solutions not containing this oxide, afford, it is true, in certain cases, precipitates, which at first view bear some resemblance to the kermes mineral ; but a more attentive examination soon shows that they are dissimilar in composition and in their properties.

All these pretended kermes are identical with the precipitates obtained, by adding, at the ordinary temperature, alkaline carbonates to alkaline solutions of the sulphuret of antimony, with alkaline oxisulphurets, which are not decomposed by simple washing with water. There is then no other sulphuret of antimony, by the humid way, than the hydrated precipitate obtained by decomposing the solutions of the salts of antimony by sulphuretted hydrogen ; prepared in any other manner, it always contains the oxide, or else a metallic sulphuret which replaces this. The last combinations

which contain an alkaline oxisulphuret, are distinguished by the property of completely dissolving in a solution of potash, whilst they are still moist, and of then giving rise, by the addition of an acid, to a disengagement of sulphuretted hydrogen, and to sulphuret of antimony, which is precipitated. The production of sulphuretted hydrogen is due in this case, to the decomposition of the alkaline oxisulphuret. The combinations of sulphuret of antimony containing the oxide, the true kermes mineral, for example, are not completely soluble whilst moist, in caustic potash, but they leave for residue, a pulverulent yellow combination of potash and sulphuret of antimony, with the oxide of the same metal, a combination which is insoluble in water, and represents the crocus of the ancients.

Hoping from the facts announced in his memoir, that he has settled the nature and composition of kermes mineral, M. Liebig has endeavoured to find a plan by which a product of identical composition can always be obtained. He proposes the following, as giving a beautiful article, of a bright flame colour, which dries readily, and then assumes the appearance of a fine crystalline powder.

Four parts of pulverized sulphuret of antimony, are to be mixed with one part of dry carbonate of soda, and melted at a red heat, till the mass is perfectly fused. Care must be taken not to use an iron instrument to stir it with. The fused mass is poured on a tile ; it is readily broken after it is cool, and can be reduced to a very fine powder. One part of this mass finely pulverized, is to be boiled for one hour with two parts of crystallized carbonate of soda, in sixteen parts of water, the whole filtered and cooled. The kermes is precipitated in the form of a heavy powder. The mother waters are to be decanted, and again boiled with the residue. These operations are to be several times repeated, till nothing remains but a yellow or brown crocus, at each cooling a corresponding quantity of kermes will be obtained.

M. Liebig also observes, that the kermes should not be washed with warm water, as this decomposes it, and as it

acts more on the oxide of antimony than on the sulphuret, which it dissolves, if this practice be followed, a kermes will be obtained deficient in oxide.   M. M. Geiger and Hesse, have also observed that if recently prepared kermes be boiled for a length of time in a large proportion of water, and not exposed to the action of the air, it is completely decomposed into sulphuretted hydrogen which is disengaged, and into oxide of antimony, which remains in solution in the water, and that the kermes, sprinkled with water and exposed to the action of the air, completely disappears after a certain time, leaving nothing but some whitish flakes.

Journ. de Pharm.

Syrup of Coffee.—M. Ferrari gives the following formula for this preparation :

Moka coffee, roasted,	℥iv.
Water,	lbij.
Refined Sugar,	lbiij.

Infuse the coffee in a pound and a half of cold water for six hours, in a close vessel, place the vessel in a water bath, giving vent to the steam ; when heated to boiling, remove the vessel, and let it stand to settle ; then decant, and add the remainder of the water. After standing for some hours, decant and gradually add the sugar, dissolve it by means of a water bath, and strain. The dose is one ounce, or even more.

Journ. de Chim. Med.

Homogeneous light of great intensity.—Mr. H. F. Talbot states that this important desideratum for many important optical experiments, can be thus obtained. It is only requisite to place a lump of common salt upon the wick of a spirit lamp, and to direct a stream of oxygen gas from a blow pipe upon the salt. The light emitted is quite homogeneous, and of a dazzling brightness. If, instead of common salt, the various salts of strontian, barytes &c., be used, the well known coloured flames, characteristic of those substances will be procured.

Lond. and Ed. Phil. Mag.

Hydrographic Paper.—M. Chevallier has examined a paper lately invented, which may be written on with a pen dipped in pure water. He found that it was prepared by soaking the sheets of paper in a solution of sulphate of iron, drying them, and then covering them with finely powdered galls. He states that similar papers may be prepared by using other solutions and powders ; thus blue is probably prepared by powdering the paper, soaked in sulphate of iron, with ferrocyanate of potash.

Journ. de Chim. Med.

Codeine.—Dr. Barbier, of Amiens, is of opinion, from experiments made with it, that codeine enjoys very remarkable medical properties, compared with the other products of opium, and even opium itself. Administered in solution or syrup, in the dose of a spoonful or half an

ounce, containing a grain of this substance, codeine acts promptly on the ganglionic nerves, and on the apparatus of innervation; it has little action on the cerebrum, and makes no impression on the spinal marrow or nervous plexus of the great sympathetic nerve; it is efficacious in gastralgia, and procures a sleep remarkable for its placidity and the calm state that succeeds to it.

It relieves unpleasant feelings in the epigastrium, and far from producing constipation, like other preparations of opium, it rather keeps the bowels in a soluble condition.

Dr. Barbier considers codeine—

1st. As a precious acquisition to the materia medica.

2d. That its action is principally exercised on the nervous plexus of the ganglionic nerves.

3d. That it induces a placid sleep.

4th. That it is efficacious in abdominal neuroses.

5th. That it does not alleviate neuralgic pains.

6th. That it does not derange the digestive functions, and appears to open the bowels rather than to constipate them.   *Journ. de Pharm.*

Solanine in the germs of Potatoes.—Dr. Julius Otto states that fatal results having been observed to follow the feeding of cattle on the residue of germinated potatoes, used for the manufacture of brandy, he was induced to examine this article. From his experiments, it results, that solanine exists in the germs of the potatoe, and which can readily be separated by treating the germs with water, acidulated with sulphuric acid, precipitating with acetate of lead to separate the sulphuric and phosphoric acids, as well as an extractive matter. The liquid being filtered, and saturated with lime water, affords a precipitate from which solanine can be separated by boiling alcohol.

From experiments made with this solanine, it appears, that the sulphate, in doses of a grain, will destroy rabbits in six hours; that in larger animals it requires three grains, and death does not take place until the expiration of nine hours. It was particularly remarked, that the action of this salt was manifested by a paralysis of the posterior extremities.

Journ. de Chim. Med.

Easy mode of separating the Copper contained in Cajeput Oil.—M. F. Schosufel, of Magdeburg, has described the following mode of separating the copper which is usually in solution in cajeput oil:—A mixture of the green cajeput oil of commerce, and a solution of caustic potash, is to be made and well shaken, heated moderately and filtered. The hydrated oxide of copper, which is formed, will remain on the filter, and the liquid will pass in almost a clear state; the oil is to be separated from the caustic ley, and several times washed with distilled water.   *Ibid.*

Artificial Cajeput Oil.—M. Mortier has made the following experiments on this subject :—Forty grains of camphor, dissolved in two drachms of concentrated acetic acid, were added to a mixture of four drachms of essence of rosemary and two ounces of distilled vinegar ; the whole was subjected to distillation in a copper alembic, with half an ounce of bruised cardamoms and sixteen ounces of water. The oil which resulted having no action on copper was not coloured. An alcoholic tincture of milfoil (ACHILLEA *millefolium*,) gave it, however, a beautiful and permanent green tinge. In two days the oil was clear. The usual mode of ascertaining whether oil of cajeput is genuine, is to drop a small quantity of it on sugar, and to dissolve this in water; if artificial, the camphor will separate. M. Mortier, however, states that if the camphor is intimately united with the oil by repeated distillations, this test fails.

The existence of the green colour depends on many circumstances. Thus, for example, wormwood sometimes furnishes a green, and sometimes a brownish oil. Essence of peppermint prepared from the recently dried leaves is yellowish. If, however, the leaves be permitted to heat, even for a single night, the oil obtained will be of a brown colour.

Journ. de Chim. Med.

Hyperiodic Acid.—M. M. Ammermuller and Magnus state that it is impossible to obtain this acid by the method given by Serullas for procuring the hyperchloric acid, for on heating the iodate of potash, the result is only a hyperiodate. When chlorine gas is passed into a solution of iodate of soda, with excess of base, and a gentle heat applied, there is a precipitation of a white, insoluble, crystalline powder, which is the hyperiodate of soda. The temperature not permitting an extrication of all the oxygen of the salt, these chemists had recourse to a hyperiodate of silver, to determine the composition of the hyperiodic acid. This salt is obtained in the form of a bright yellow precipitate, as when a solution of hyperiodate of soda, in weak nitric acid, is decomposed by nitrate of silver. By evaporating the solution of this precipitate in nitric acid, it gives rise to crystals of an orange yellow colour.

The formula of this salt is $\overset{\cdots}{\text{i}}$ Ag. or,

Iodine,	42.313
Silver,	36.237
Oxygen,	21.448

It is a neutral and an hydrous hyperiodate of silver. This neutral salt is decomposed by pure water into an insoluble basic salt and hyperiodic acid. This is the best method of obtaining this acid in a state of purity, which, like hyperchloric acid contains seven atoms of oxygen to a double atom of chlorine or iodine. The solution of hyperiodic acid may be boiled without alteration ; and on evaporation, furnishes the acid in a crystalline state ; this acid forms crystallizable basic salts.

Journ. de Pharm.

Influence of temperature of Ioduret of Starch.—M. Laissaigne observes that ioduret of starch, obtained by cautiously pouring an alcoholic or aqueous solution of iodine in a solution of amidine, prepared by treating fecula rubbed down in cold water, is not only remarkable for its beautiful indigo blue colour, but also for its peculiar character of losing its colour at 89 or 90° R., and of regaining it again on cooling. This phenomenon may be several times reproduced with the same solution, if care be taken not to pass the point at which the loss of colour is complete; for by boiling the solution for a minute to a minute and a half, it loses its property of regaining its colour on cooling. The iodine, in acting on a part of the amidine, is transformed into hydriodic acid, and we may, by cautiously adding a weak solution of chlorine, cause a regeneration of the blue colour of the ioduret, which is again formed by the iodine thus set at liberty.

The point of decolouration of the ioduret of amidine, appears subordinate to the density of the liquid. In fact, a concentrated solution which loses its colour at $+89$ R., when diluted with an equal bulk of water, becomes colourless at 77 R.; and if the proportion of water be increased, at even a lower temperature. Amidine made from wheat starch, forms a combination with iodine, which is remarkable for its beautiful violet colour; this seems to establish a difference between this product and that from potatoe starch. The action of acids on these two iodurets, also denotes a difference between them.   *Journ. de Pharm.*

Purification of Carbonate of Soda.—M. Gay Lussac recommends the following method for obtaining a pure carbonate of soda. Take the crystals of carbonate of soda, such as are met with in shops; having washed them, make a saturated hot solution, when this is set to cool, stir constantly with a rod or spatula, to obtain small crystals; this cooling may be accelerated by placing the vessel containing the saline solution in cold water. It sometimes happens, that when very much cooled the solution does not crystallize on becoming solidified. This is the moment to stir very rapidly, to prevent the conglomeration of the crystals. This delay in the crystallization may be prevented by throwing a few crystals into the solution at the moment when it begins to become supersaturated. Having obtained the crystals, put them into a funnel, in the neck of which place a little tow or cotton to retain them. At first let them drain, then wash with small quantities of distilled water, waiting till the preceding washing has run through. Test from time to time, the washings with nitrate of silver, having previously saturated them with pure nitric acid; the purification of the salt is complete when the liquid remains transparent. By this process, and in the first operation, the greater part of the carbonate of soda may be obtained in a perfectly pure state. The mother liquid, and the washings may be evaporated and treated in the

same manner. The same mode of purifying may be used with advantage for many other salts. Its efficacy is founded upon the extreme facility with which water runs through and washes sandlike crystals.

Philos. Mag.

Honey of Trebizond.—Mr. K. E. Abbott, in a letter read before the Zoological society of London, gave some account of the famous honey of Trebizond, spoken of by Xenophon in his history of the retreat of the ten thousand Greeks, as having produced the effect of temporary madness, or rather drunkenness on all who ate of it, without, however, causing any serious consequences. It is supposed to be from the flowers of the *Azalea Pontica* that the bees extract this honey, that plant growing in abundance in this part of the country, and its blossoms emitting the most exquisite odour. The effect which it has on those who eat it is as Mr. Abbott has witnessed, precisely that which Xenophon describes; when taken in a small quantity it causes violent head ache and vomiting, and the unhappy individual who has swallowed it, resembles as much as possible a tipsy man; a large dose will completely deprive him of all sense and power of moving for some hours afterwards. *Ibid.*

Juniper Berries.—The fruit of the juniper is not a true berry, but a small cone, composed of three scales, forming a pulpy envelope, and containing triangular or quadrangular, hard seeds. These seeds are marked with a multitude of small cavities, each of which contains a small spiral tube. In the green seeds, these tubes are filled with essential oil, but in the mature fruit they contain turpentine and resin; hence the unripe fruit contains more essential oil than the ripe, and still more than the dried article of the shops. *Journ. de Chim. Med.*

Valerianic Acid.—M. Trommsdorf has satisfied himself that the acid discovered by Pentz in the Valerian, and which he considered as the acetic, is a new acid, having the following properties. It is a colourless, limpid, and oleaginous liquid; its smell has much analogy to that of the Valerian root, but is more disagreeable, it diminishes when the acid is combined with a base, but never entirely disappears. Its taste is very acid and repugnant; the peculiar sensations it occasions on the gustatory organs persisting for a length of time. When very much diluted it leaves a sweetish taste. The density of this oleaginous acid at 26″ 6‴ of pressure, and at 10° C. is 0.944. It remains liquid at 21; it burns without residue, affording a vivid flame; it boils at 132° under a pressure of 27″ 6‴; it is soluble in 30 parts of water at 12° C. Alcohol dissolves it in all proportions. Essence of turpentine and olive oil do not appear to dissolve it. Concentrated acetic acid of 1,07 dissolves it rapidly, and in large proportions. Sulphuric acid, when cold, gives it a yellow colour, and when hot

chars it, disengaging sulphuric acid. It may be prepared by agitating the essential oil of valerian with carbonate of magnesia and water, and distilling, an oil passes over which is not acid, and whose smell is less powerful than the original oil. Sulphuric acid is to be added to the fluid in the retort, and the mixture redistilled. *Annal. de Chim.*

Protoxide of Copper.—A very economical method of preparing this article is given by M. Malaguti : 100 parts of sulphate of copper are to be melted at a moderate heat, with 57 parts of crystallized carbonate of soda, and the action of heat continued till the mass becomes solid, this is then to be pulverised, and well mixed with 25 parts of copper filings, and the mixture put into a crucible and subjected to a white heat for twenty minutes. The mass when cool is to be pulverized and washed : the residue will be protoxide of copper, of a beautiful red colour. *Ibid.*

Butter of Cacao.—M. Boutin has discovered a peculiar, crystallizable neutral principle in this article, by treating it with alcohol. It is saponifiable, and with the alkalies gives rise to a very remarkable new fatty acid. *Journ. de Pharm.*

Test for Iodine.—Mr. A. Thomson has found that very minute proportions of iodine may be detected by the following method. This is founded on the property possessed by chlorine gas of instantly decomposing solutions of hydriodic acid, and the hydriodates ; when this gas comes in contact with the surface of the solution, the most minute particle of iodine becomes apparent. If the solution contains only $\frac{1}{1500}$ of hydriodate, the decomposition is instantaneous, and the free iodine appears. The moment the gas touches the surface, a slight brown pellicle is formed. If a very diluted and cold solution of starch be now added, the characteristic colour of the ioduret of starch is manifested. *Ibid.*

Bignonia Catalpa.—We find in the *Observatore Medico* that M. Automarchi, following the example of Kœmpfer and Tauberg, has administered the seeds of this plant in asthma with satisfactory results. The mode in which he gave it, was to make a decoction of three or four of the beans in twelve ounces of water, to be boiled away one half; this dose is to be given morning and night.

These seed vessels have been analized by M. Grossot, with the following results. 1st. Ten parts in the hundred of a bitter like substance. 2d. Free malic acid. 3d. Malate of lime. 4th. An uncrystallizable saccharine matter. The bitter like substance is granular; its colour is reddish brown; its taste is analogous to that of butter of cacao; its smell is peculiar; it is insoluble in water, and in anhydrous alcohol; wholly soluble in potash, when heated it melts, giving out a fetid, animalized smell. *Journ. de Chim. Med.*

Dry Extract of Asparagus.—This is prepared by placing the filtered juice of asparagus shoots on porcelain plates, heated by steam, and evaporating to dryness; when fully dried it may be removed in the form of small scales of a beautiful brownish yellow colour, resembling the dry extract of cinchona. This extract attracting the humidity of the air, must be preserved in dry and well stopped bottles. One hundred grammes of juice which was prepared by M. Boullay, gave ten grammes of dry extract. *Ibid.*

Creosote Ointment.—This preparation has been recommended in obstinate cutaneous affections.

It is formed of axunge $\tilde{z}$i.
creosote $\mathfrak{Z}$i.

To be well incorporated in a porcelain mortar. *Ibid.*

Hemlock Plaster.—This plaster has undergone numerous modifications in its preparation. M. Duclou has proposed another, which consists in adding to the melted mixture of resins and gum resins, a certain quantity of extract of conium prepared with the dried plant and alcohol. In admitting with the author the neatness of this mode of operating, it remains to ascertain whether the preparation is equal in its medical effects, to those made with the fresh plant; more especially as the active principle (conicine) is readily decomposable, during the drying of the plant, and the action of the heat employed in the preparation of the alcoholic extract.
Journ. de Pharm.

Syrup of Orgeat.—M. Blondeau recommends the following formula as affording an excellent article.

Sweet almonds	lb.vj.
Bitter do.	lb.ij.
Gum Arabic	lb.j.
Sugar	lb.xx.
Honey	$\tilde{z}$vj.
Orange flower water	$\tilde{z}$viij.

Ibid.

Empyreumatic Oil of Chabert.—This oil which has obtained much celebrity in the removal of tapeworms is made by mixing

Volatile oil of hartshorn $\tilde{z}$iv.
Essence of turpentine $\tilde{z}$xij.

Digest for four days and distil till twelve ounces are obtained. The dose is thirty drops morning and evening. *Journ. de Pharm.*

Borate of Magnesia.—Mr. Wohler observes that it is known that borate of soda produces no precipitate in a solution of sulphate of magnesia, but

if a mixture of these solutions be heated, an abundant white precipitate is formed, which as the liquid cools is slowly but completely redissolved. A similar solution in which the precipitate had disappeared remained for several winter months at a temperature below the freezing point. During this time there was a deposit of beautiful radiated groups of acicular crystals on the sides of the vessel, which closely resembled those of me-rotype. These crystals, insoluble either in hot or cold water, were pure borate of magnesia or boracite, with 16 atoms of water of crystallization

or $\ddot{M} g \overset{\cdots}{\ddot{B}}{}^2 + 16 H.$

At a later period another salt appeared in large, transparent crystals, this was a double borate of magnesia and soda. This salt, completely soluble in cold water, presented an alkaline reaction, and was not precipitated by ammonia. Its solution possesses the characteristic property of becoming turbid when it is heated, and of depositing an abundant white precipitate, which, as the fluid cools, is entirely redissolved. It is therefore to the formation of this salt in a mixture of solutions of sulphate of magnesia and of borax, that the turbidness occasioned by the application of heat, must be attributed, this begins to manifest itself at about 70°. R. This precipitation caused by heat in the solution of the double salt, arises from the change that takes place, into a basic borate of magnesia, borate of soda, and free boric acid.

The hydrate of magnesia, digested with a solution of borax, is dissolved in large proportions, and gives rise to the above mentioned double salt.

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Hydrocyanic ether.—M. Pelouze has lately discovered a new ether which he calls hydrocyanic, while examining the effects produced by heat on a mixture of the sulphovinate of barytes with cyanuret of potassium. This ether is liquid, colourless, possesses a very pungent alliaceous odour, and acts energetically on the animal economy. It is inflammable, boils at 82° R., under atmospheric pressure, its density is 0.787, at a temperature of 15° R., it is but little soluble in water, but perfectly so in alcohol or sulphuric ether. It does not precipitate the nitrate of silver, and in this respect resembles hydrochloric ether, which does not decompose the salt until it has been destroyed by the action of heat. M. Pelouze regards this ether as composed of equal volumes of olefiant gas, and of the vapour of hydrocyanic acid, compressed one half.

Gazette des Hopitaux and Amer. Journ. Med. Science.

INDEX I.

M

INDEX II.

Subjects of Articles in the Sixth Volume of the Journal of the Philadelphia Journal of Pharmacy.

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